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SUMMARY OF RECENT ABSTRACTS*

I. CHOLERA

Epidemiology

ROGERS has for many years studied the forecasting of cholera in India, relating outbreaks to absolute humidity, and WEI (p. 132) has now applied these principles to Shanghai. He finds that cholera tends to occur only when the absolute humidity exceeds 10 mm. Hg, but that it does not necessarily occur when the humidity is favourable. Nevertheless, a study of the periodicity of epidemics (which have occurred at intervals of 2–8 years), and of humidity, makes the forecasting of epidemics possible.

Aetiology : Clinical Findings

ROGERS (p. 461) relates the history of Surgeon-Major Macnamara, who, long before Koch discovered the vibrio, suggested that cholera was due to a living organism spread by water, and who wished to conduct bacteriological investigations in Egypt, but was refused facilities by the India Office, during the year when Koch was sent by the German government and succeeded in isolating the vibrio.

SENECA and HENDERSON (p. 357) describe the culture media they used for isolation of *V. cholerae* in Egypt in the epidemic of 1947. They found that faeces became, and remained, negative after the 5th day ; in carriers the organism remained for less than 24 hours in the stools. In 3,000 contacts *V. cholerae* was found in the stools of 61, and of these only 2 developed symptoms. The authors conclude that healthy contact carriers may spread the disease. The use of a soluble non-absorbable sulphonamide early in an attack of cholera, when the vibrios are present in the intestinal contents, may be valuable in treatment.

CH'I *et al.* (p. 738) have developed a medium for the isolation of *V. cholerae*, in which potassium tellurite and rosalic acid are incorporated, to inhibit Gram-negative and Gram-positive organisms respectively. This gives good results in artificially infected stools, and is recommended for trial in the field.

DAWSON and BLAGG (p. 739) note that in previous studies saliva from normal persons showed a bacteriostatic action on *V. cholerae* which could not be demonstrated in saliva from cholera patients. They have studied the

*The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1950, v. 47. References to the abstracts are given under the names of the authors quoted, and the pages on which the abstracts are printed.

antibacterial principles to which this effect is due, and find that lipase is a constituent of them, and they have also established the fact that the phospholipid content in the plasma and saliva is much higher in healthy persons than in malnourished persons (in whom cholera is most often found). Normal healthy saliva may be a first line of defence against cholera, and it is possible that the antibacterial effect of saliva may serve as an indication of the antibacterial threshold of the other body secretions.

Treatment : Control

A study of the laboratory evaluation of remedies for cholera has been carried out by COLLIER *et al.* (p. 236), who suggest that studies should be made of vibriostatic activity *in vitro*, solubility, toxicity, retention in the mobile contents of the alimentary canal, activity in the alimentary canal, and stability in the alimentary canal. They have applied these tests to sulphaguanidine and formo-cibazol, and conclude that formo-cibazol may be expected to be rather more effective than sulphaguanidine in cholera, though its value may be limited by its inability to deal with large numbers of organisms. Details are given of the criteria used in the various tests, for some of which mice are used. COLLIER *et al.* (p. 980) tested for vibriostatic activity a number of pteridine compounds. The tests were made on cultures in peptone water, and also by estimating the vibriostatic activity of the faeces of mice to whose diet the drugs were added. Details should be sought in the original. When sulphaguanidine was given as well as the pteridine there was evidence of synergic action.

The outbreak of cholera in Egypt in 1947 offered an opportunity to estimate the prophylactic value of cholera vaccine. KAMAL Bey (p. 738) shows that villages in which inoculation was carried out before cases of the disease occurred showed lower incidence and case mortality than villages in which inoculation was begun after the beginning of the outbreak in them. The decline in case mortality is better evidence of the value of the vaccine than the reduction in incidence, since the latter may have been a reflection of the decline of the epidemic. The vaccine was given as a single dose of 8,000 million vibrios, and the author states that its use was continued into the succeeding year, as a precaution, but that no further outbreak occurred.

SINGH *et al.* (p. 848) report that the polysaccharide extracted from *V. cholerae* by a method which they describe was found to exert considerable protection in mice, though rather less than the vaccine used in the controls. They report studies on the growth of *V. cholerae* in media containing the polysaccharide fraction.

The last article published by the late Professor GREENWOOD (p. 35) commemorated the work of William Baly, who, in a report to the College of Physicians, did not accept the conclusions of Snow, that cholera was a water-borne disease, but made comprehensive suggestions for preventive measures. Baly was ahead of his time in realizing that quarantine was not the answer to the problem. *Charles Wilcocks*

MALARIA

WORLD HEALTH ORGANIZATION. TECHNICAL REPORT SER. NO. 8. **Expert Committee on Malaria. Report on the Third Session Geneva, 10–17 August, 1949.** 48 pp. Geneva. 1950, May. [2*s.* 3*d.* ; $0.30.]

This report of the third session of the Expert Committee on Malaria, WHO, has six sections. The first section stresses once more the need for international malaria control on a world-wide basis. Great success has attended the use of

residual insecticides in eradicating or controlling malaria, but the need for effective antimalaria organizations in many countries and for more trained personnel persists. The ultimate aim of WHO should be the elimination of malaria as a public health problem from the world.

The second section deals with malaria therapeutics. The ideal antimalarial drug has yet to be discovered. The efficacy of individual drugs varies in different places and with the state of premunition of the subject. Local or regional manufacture of antimalarials should be stimulated : the manufacture of synthetics is more to be desired than extension of cinchona plantations. The discussion is limited to five groups of drugs : quinine ; mepacrine ; chloroquine and other 4-aminoquinolines ; proguanil ; pamaquin and other 8-aminoquinolines.

Quinine is still widely relied on in malarial emergencies (parenteral injections) though certain synthetics are equally effective. Quinine is not quite so non-toxic as generally believed, as witness its association with blackwater fever and the occasional constriction of the visual field that results from its use [this *Bulletin*, 1948, v. 45, 680]. For suppressive treatment quinine has been supplanted by more effective synthetics.

Mepacrine has no causal prophylactic action, but it is a highly effective suppressant and a more effective therapeutic agent than quinine. Its slow elimination from the body results in wider spacing of *P. vivax* relapses than occur after quinine therapy.

Chloroquine rapidly alleviates acute attacks of malaria and can effect radical cure of *P. falciparum* infections. A loading dose on the first day of therapy secures prompt action. Relapses are delayed even longer than with mepacrine. A single dose of 0·5 gm. chloroquine diphosphate is effective in individuals possessing some degree of malaria tolerance. As a suppressant its action is unsurpassed : 0·5 gm. once a week (adult dose) gives almost complete protection against the three common forms of human malaria. Its disadvantages are that it has a smaller margin of safety than proguanil, and that it is relatively expensive. Other 4-aminoquinolines have similar antimalarial properties.

Proguanil has a wider range of safety than any other antimalarial : 6–12 mgm., base, daily for 4 days can effect clinical cure of *P. vivax* malaria ; 1,400 mgm. have been given for 20 days without producing ill effects. It has a causal prophylactic action against *P. falciparum* and a suppressive action against all species of malaria parasite. Weekly doses of 0·3 gm. of the monohydrochloride salt have given a high degree of protection in many places. Interval to relapse after proguanil treatment has been shown to be shorter than after chloroquine. The action of proguanil on acute attacks is slower than that of the three drugs previously considered. Reinforcement with adequate doses of mepacrine on the first day of treatment secures prompt action. Single doses can effect clinical cure in persons possessing some degree of malaria tolerance. Certain strains of parasites have natural or acquired resistance to proguanil.

Pamaquin and related 8-aminoquinolines when given with quinine can effect radical cure of *P. vivax* infection : in this they are pre-eminent. The drugs are relatively toxic. The three drugs in order of decreasing toxicity are pamaquin, pentaquine and isopentaquine.

The discussion of the dosage of these drugs commonly recommended largely repeats the information given in the report of the second session of the Expert Committee [this *Bulletin*, 1948, v. 45, 948]. The Committee considers that WHO should stimulate and co-ordinate research on malaria therapeutics and suppression through existing institutions rather than undertake trials on its own initiative. Such inquiries should be carried out on uniform lines for which

purpose certain basic principles are laid down. It is further recommended that the following antimalarial drugs should be included in the International Pharmacopoeia : quinine sulphate ; quinine hydrochloride ; mepacrine hydrochloride ; mepacrine methane sulphonate ; chloroquine diphosphate ; proguanil hydrochloride ; pamaquin naphthoate ; pentaquine phosphate ; isopentaquine mono-oxalate.

The third section of the report deals with insecticides. It notes with satisfaction the creation by WHO of an Expert Committee on Insecticides to specify international standards and to deal with all other questions relating to insecticides. It notes also the recommendation of the U.N. Economic and Social Council that the U.N. and its specialized agencies should aid the production of basic forms of insecticides wherever possible.

The fourth section of the report is concerned with organization and planning. The rigid enforcement of antimosquito sanitation in and around sea- and airports is the most effective safeguard against the introduction of anophelines by ships or aircraft. Further investigations are necessary before regulations are formulated for the treatment of ships of heavy tonnage. The relative merits and disadvantages of malaria control by residual spraying or by anopheline species eradication should be considered before extensive antimalaria measures of control are undertaken. Larval control should be abandoned in rural areas where residual insecticides are found to be effective. The convocation of a malaria conference in Tropical Africa, sanctioned by the Second World Health Assembly, should be given high priority.

The fifth section of the report is entitled " WHO Malaria Activities and Perspectives ". Priority should be given to economically underdeveloped malarious countries, assisting them in the establishment of adequate malaria-control organizations. Collaboration with FAO should be developed in assisting governments to control malaria in food-production areas. The possibility of WHO providing specialized training of selected candidates for specific positions on field projects should be considered. WHO should not hesitate to carry out pilot trials of malaria control in areas where no previous residual spraying has been done. The demonstration teams so employed must remain responsible to WHO but they should fit themselves into the framework of the respective departments of health or of the malaria services, if such exist.

The members of the Expert Committee on Malaria who attended the third session were : AFRIDI, COVELL, GABALDÓN, RUSSELL, SINGH, SWELLENGREBEL, VAUCEL and WILSON ; coopted members : COATNEY, MACDONALD and MISSIROLI ; secretary : PAMPANA. *Norman White*

FORD, E. **The Malaria Problem in Australia and the Australian Pacific Territories.** *Med. J. Australia.* 1950, June 10, v. 1, No. 23, 749–60, 2 figs. (maps). [Numerous refs.]

In the Australian region the islands of Melanesia, affected to a hyperendemic degree almost in their entirety, form the great reservoir of malarial infection. The disease prevails throughout the mainland of New Guinea and its associated island groups, New Britain, New Ireland, the Admiralty Islands (Manus), the Solomon Islands, and the New Hebrides. In all these islands it forms a major health problem. To the northward malaria does not exist in the Marshall and Caroline groups. Similarly it does not extend eastward from Melanesia to New Caledonia and the Loyalty group, nor to Fiji, Samoa, Tonga or the other islands of Polynesia. From these islands anopheline mosquitoes have not been recorded. To the west of New Guinea the disease extends to the Indonesian islands of the Oriental Region. While malaria is not present in the major part of the Australian mainland, foci are found in northern parts of the continent,

and conditions of potential danger from its introduction exist over a wide area. The malarious and potentially malarious areas lie north of the 19° South parallel and west of 170° East longitude. On the Australian mainland this area is governed by the distribution of the efficient vector, *A. punctulatus farauti*. In Melanesia *A. punctulatus punctulatus* is also a dangerous vector. [Their breeding waters are similar to those of *A. gambiae* in Africa.] Seven others are listed as potential local vectors.

A detailed historical account of malaria follows for each of the following territories: Melanesia, Queensland, North and North-West Australia and Southern Australia. Of equatorial type and of perennial transmission, malaria forms a serious hazard to the health and development of the native peoples of Melanesia and is the cause, in wide areas, of a high infant mortality and a lowering of fitness which increases the fatality from other diseases. It exists also as an obstacle to European development, and the conditions pertaining ensure rapid infection of incoming non-immune persons, unless rigorous preventive measures are taken. In the complex of factors that are the cause of depopulation in native communities in parts of Melanesia, chronic malaria plays a large part. Great danger exists to unprotected indigenous people from the non-malarious highlands who visit coastal areas, and heavy mortality has at times occurred in these. For this reason such people, during the war, were prevented by Army regulation from being brought into malarious areas for any reason. This policy has also been pursued by the civil administration, and recruiting from the mountain villages for labour on the coasts forbidden. Though *P. falciparum* dominates, *P. vivax* is a frequent concomitant and *P. malariae* occurs sporadically, particularly in children.

Fluctuations of established *vivax* malaria and occasional outbreaks of introduced *falciparum* malaria are characteristic of Queensland, in which Cairns is the main focus for the whole continent.

In the Northern Territory and North-West Australia epidemics of subtertian and benign tertian malaria have arisen from time to time, usually on alluvial mining fields, construction camps or cattle stations, where favourable conditions for transmission may arise upon the introduction of human carriers. Owing to the sparse population of the Territory (0·01 person per square mile), and the great distances between settlements, such outbreaks have usually been localized, though at times they have become widespread. The source of labour used to be the malarious islands of Melanesia. The Army malaria control policy during the military occupation of Northern Australia relied mainly upon the exclusion of gametocyte carriers from the potentially malarious area. Units and individuals from front-line troops in Melanesia were not allowed to enter the prescribed area for six months after leaving a malarious place. Any malarious patients were removed at once by air.

North of latitude 19° South widespread implantation of malaria has been counteracted by sparseness of population. Control of existing foci is usually difficult on account of the scattered population involved and the usually insufficient resources for organized work. But the important Queensland Government scheme for granting 50 per cent. subsidies to local authorities on approved anti-mosquito projects, and the effective work of the Northern Territory Medical Service against outback epidemics in recent years, are substantial foundations for future measures.

Health authorities are constantly concerned about the introduction by aircraft of new vectors from the north, such as *A. sundaicus* or *A. maculatus* or even *A. punctulatus punctulatus* from New Guinea. One of the most important public health tasks in the Pacific is the continued exclusion of *A. punctulatus* from Fiji, Samoa and the uninfected Micronesian groups of islands.

In Melanesia malaria in the native population has been regarded as largely beyond control. Its widespread and heavy incidence, the meagre economic facilities, and the primitive standard of civilization pertaining provide a task which might well appear to be beyond practical solution, though amelioration is now possible by recent methods. Of the newer methods, DDT spraying for residual effect appears to offer most advantage. Field experiments in Papuan villages gave promising results [this *Bulletin*, 1948, v. 45, 45], though the striking effects obtained in other regions against indoor-resting anophelines are not to be expected on account of the habits of *Anopheles punctulatus*, which usually allow only minimal contact with treated surfaces.

The use of paludrine [proguanil] and other recent drugs offers further means of control, especially of the severe epidemics that at times occur. Field investigations are required to find whether more than occasional use should be made of these among immune native people in circumstances where supplies and distribution are assured.

[A comprehensive account well worth reading in the original by malariologists.] *R. Ford Tredre*

FARINAUD, M. E.; CHOUMARA, R.; ROYER, J. Infestation palustre et démographie dans les populations Montagnardes du Sud-Indochinois (P.M.S.I.). Première Partie. Le paludisme dans les P.M.S.I. Chimioprophylaxie et pulvérisation de D.D.T. [**Malarial Infestation and Demography of the Mountain Population of Southern Indo-China (P.M.S.I.). First Part: Malaria among the P.M.S.I.; Chemoprophylaxis and DDT Dusting.**] [FARINAUD & CHOUMARA]. Suppl. to *Bull. Économique Indochine.* 1950, Mar., No. 22, 5–22, 1 fig. Seconde Partie. Essai de démographie statistique. [**Second Part: Demographic Statistical Study.**] [FARINAUD, ROYER & CHOUMARA.] *Ibid.* 25–48, 4 charts.

The high plateaux of Southern Indo-China, comprising the four provinces of Kontum, Pleiku, Darlac and Djiring, are bounded on the north by the 15th parallel and backed on the east by the foothills of the Annamite mountain chain which falls abruptly towards the China Sea. To the south-east this vast region falls to the Mekong River basin. The Darlac and Pleiku plateaux have an average height of 500 to 700 metres; the Langbiang plateau attains in places 1,400 metres. The country becomes less hilly as the distance from the Annamite range increases: marshy depressions or lakes fed by numerous streams and valleys in which water courses with rocky beds have their source and make their appearance. The soil for the most part is laterite. This red soil is still abundant in areas of primitive forest, but where fire has cleared trees and brush the soil has been washed away leaving desert with scanty, stunted vegetation. This is specially marked in parts of Pleiku. The rainfall is heavy, humidity high, and only in part of the plateau are there well-marked wet and dry seasons. Food grains are grown in the valleys, and in some red-soil areas tea, coffee, rubber and cinchona are produced. Attempts at rice growing, where irrigation is feasible, have met with promising success. The population is scanty and undernourished; the diet deficient in animal protein and protective foods.

Malaria is hyperendemic in the High Plateaux: at altitudes below 1,200 metres transmission occurs throughout the year. The infant mortality rates are excessively high: 96 per cent. of children are infected with malaria in the first year of life. Spleen rates are at their highest between the 2nd and 4th years of life, but not before the age of puberty do the young obtain a satisfactory degree of premunition. Even among adults premunition is apt to break down in times of scarcity or other adverse condition.

Fourteen species of *Anopheles* have been identified in this region, but only two are important vectors, *A. minimus* and *A. jeyporiensis*. Together they constitute 80 per cent. of anophelines captured in houses : both are excessively prevalent.

In June 1948 a special antimalaria and mobile dispensary service was established to deal with the more urgent health problems of the area. A number of villages were selected in different parts of the area as experimental centres to determine the most effective malaria control measures in the conditions obtaining. In one group of villages drug prophylaxis alone was used, and a comparative study was made of the efficacy of quinacrine [mepacrine], nivaquine and paludrine [proguanil] for this purpose. In a second group of villages the prophylactic administration of quinacrine was supplemented by DDT spraying of houses. In a third group DDT spraying was the sole control measure employed. The reason for combining drug prophylaxis with DDT spraying in one set of experiments is that village populations commonly leave their houses from March onwards and spend the rainy season living in huts near their work, often at a considerable distance from the village. DDT spraying alone was reserved for villages with more stable populations. Prophylactic drug administration was restricted to children up to 15 years of age, pregnant women and nursing mothers, the aim being, not to eradicate infection but rather to help children acquire that state of premunition that characterizes the adults.

It is not possible to summarize in any detail the results achieved during the eighteen months reported on : they are set out in graphic form and in tables. They show that malaria control in this hyperendemic area is feasible at reasonable cost : this is shown by a remarkable decline in mortality rates in the early years of life ; a marked fall in spleen rates and in the size of the enlarged spleen ; low parasite rates at the end of the period under report, and by an excess of the number of births over the number of deaths which was, formerly, an unusual phenomenon in this region. Of the three drugs used as prophylactics quinacrine gave the poorest results, nivaquine the best with paludrine not far behind. DDT spraying combined with drug administration gave better results than drug administration alone. In certain villages DDT spraying alone gave as good results as the combined method of control. Two sprayings a year have been proved sufficient.

The second part of this report is a demographic statistical study of the population of the high plateaux. The material for study was in part supplied by L. Lieurade who during the three years 1936–39 made an inventory of the populations of nearly all villages in Kontum Province, some 60,000 persons. (The total population of the four provinces approximates 377,000.) In addition the vital statistics of the villages concerned in the malaria control observations were available. Their populations included 3,294 Rhadés and 2,271 Banhars. Information is given concerning the sex and age distribution of the populations ; mortality rates before and after the application of malaria control measures ; birth rates ; fecundity rates ; weight increase of infants during the first year of life ; and the demographic balance. On the whole the figures, insufficient as they are, indicate that there is no natural increase of the population of the High Plateaux.

The enquiry has shown that effective control of malaria, by far the most important cause of morbidity and death, is possible. Smallpox vaccination is likewise essential ; periodic waves of smallpox have caused great havoc. Other social measures are likewise called for to raise the standard of living. Improved methods of agriculture could exploit the potential wealth of the country. Only such "integral bonification" of the country can assure prosperity for this backward population. *Norman White*

Trinidad Govt. **Annual Report of the Malaria Division, Health Dept., Trinidad & Tobago.** 1949. 86 mimeographed pp., 6 graphs (4 coloured) & 1 map.

Since the inception of the Malaria Division of the Trinidad Health Department in 1943 the total number of deaths annually from malaria has fallen progressively from 602 to 148 in a population of 600,000; the death rate and infant mortality rates have decreased from 16·45 and 93·22 to 12·26 and 79·98 respectively, while the birth rate increased from 38·22 to 40·25 in 1948 and then dropped to 37·55.

School spleen and parasite rates in 1949 are detailed, averaging 2·2 and 3·1 per cent. respectively, compared with 20–30 and 20–40 in the last decade. The slide diagnostic service examined 10,424 slides with 9·2 per cent. positive, of which *P. falciparum* was found in 84 per cent., *P. vivax* in 14 per cent., and *P. malariae* in 2 per cent. These results are analysed in graph form. Treatment centres at schools operated in areas where the spleen rate exceeded 20 per cent.; total children treated numbered 330. [The drugs used are not mentioned.]

A very detailed report by R. A. Senior-White of anopheline investigations consists of 16 sections with 46 associated tables and is of interest chiefly to the entomologist. The immense aggregate anopheline production of the Glandon marshes, the northernmost section of the Caroni swamp, is shown to be of small significance in malaria transmission as only 1 per cent. of *Anopheles aquasalis* had fed on human beings. Watercress cultivation is also a source of *A. aquasalis* production, not so much from the actual watercress pits as from associated irrigation. Precipitin reactions indicate that *A. nenmaculipalpus* hardly touches man if animals are plentiful, and under similar conditions between 2 and 3 per cent. of *A. aquasalis* contained human blood. Man can be completely protected against *A. aquasalis* by his animals. Transmission of malaria by this mosquito is fully discussed. The examination of a village deliberately left free of DDT showed an *aquasalis* oöcyst rate of 0·1 per cent. in 2,336 examined; the sporozoite rate was nil, supporting the previous evidence of only one natural gland infection in the records of the whole island. Post-seasonal blood examinations of children were all negative in this village. Everything points to *A. aquasalis* being a very poor vector and "one can only conceive of *aquasalis* causing malaria on the scale of the *fluviatilis* group in the Oriental and *gambiae* in the Ethiopian Region if there was absolutely no opportunity for it to exercise its high zoophilic preference, and even then the destruction rate eminent upon its habit of outside resting militates against its ever becoming a really efficient vector."

The Chief Sanitary Inspector reports in detail on the operation of larval field survey, dawn trap captures, house, stable and human bait captures in 14 stations.

The importance of centralized supervision of malaria control is stressed. The main effort was laid on residual spraying at a cost of 1·65 dollars per house for the year. In all, 25,847 human and 20,487 animal habitations were treated. The population affected was 111,695. There is an interval of 8 months between applications of DDT in kerosene.

Bromeliad malaria continued to be controlled by the Gipsy Moth Sprayer with the use of copper sulphate solution. The field staff for this purpose consists of units for trace cutting, for actual handling of the spray gun, for working and maintenance of the pump and for mosquito survey. An aircraft disinsectization service functions at the island airfield; in 7,248 aircraft examined, 3 anophelines, 82 non-anophelines and 1,672 other insects were found.

The malariologist of the Division is Dr. H. P. S. Gillette. Appended is a progress report for 1949 of the malaria eradication programme in the island of Tobago undertaken by the Rockefeller Foundation in co-operation with the Trinidad Government. Permanent drainage of coastal swamps with protective sea-heads as necessary is in process ; concreting of earthen drains along main roads continues. Malariol is used by anti-larval gangs. Every house in the island was sprayed with DDT twice in the year. Five per cent. of some 6,000 slides examined were positive for malaria. It is believed that transmission is slight and confined to the early part of the rainy season. The total expenditure for 1949 was 65,840 British West Indies dollars, of which 87 per cent. was provided by the Government of Trinidad and Tobago.

R. Ford Tredre

GARCIA, E. Y. **Quinine, Paludrine and Atabrine Fast Malaria with Exo-Erythrocytic Schizonts in the Peripheral Blood successfully treated with Parenteral Aralen.** *Clinical Excerpts* (Winthrop-Stearns, Inc., Manila), 1950, Jan.–Mar., v. 2, No. 1, 22–6.

In this paper the author, who has previously recorded the presence of exo-erythrocytic schizonts " in all human brains that died of cerebral malaria due either to *Plasmodium falciparum* or *Plasmodium vivax* " (GARCIA, E. Y. *Malaria in War and Peace*. [1945] The Grace Trading Co., Manila, Philippines, p. 15), claims to have seen " an unmistakably growing exo-erythrocytic schizont attached somewhat to a monocyte " in a thick smear taken from a Filipino boy suffering from a fourth attack of relapsing *vivax* malaria. [It is difficult to imagine how a stage of the parasite whose normal development takes place in the parenchyma cells of the liver could have arrived in such an unlikely situation. The microphotograph depicting the object seen is to the reviewer entirely unconvincing.]

G. Covell

VERMEIL, C. & DOBY, J. M. Présence d'*Anopheles d'thali* Patton dans le Sud Tunisien. [**Identification of *Anopheles dthali* South of Tunis.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 7/8, 443–4.

In August 1949, the authors found *Anopheles dthali* breeding in shallow holes, surrounded with vegetation, in the bed of a *wadi* in Tamerza, Tunis. *Anopheles sergenti* and *Culex pusillus* were found in the same breeding place. *A. dthali* was also found near Gafsa where the *wadis* Sidi Aïch and el Kebir meet. Here again it was found in water-containing holes in the sands, but there was less vegetation than in Tamerza.

This species does not appear to have been recognized in these areas before.

H. J. O'D. Burke-Gaffney

HOLSTEIN, M. Guide pratique de l'anophelisme en A.O.F. [**Practical Guide to the Anophelines of French West Africa**] 55 pp., 10 pls. & 1 chart. [34 refs.] 1949. Dakar : Direction Générale de la Santé Publique.

This is a simple practical guide to anopheline mosquitoes and malaria with special reference to species of *Anopheles* recorded from French West Africa.

The book deals briefly with classification, morphology and biology of mosquitoes but refers to the genus *Anopheles* in more detail. Descriptions and keys for identification of larvae and adults are given for nine of the commoner species : *A. coustani*, *A. funestus*, *A. gambiae*, *A. maculipalpis*, *A. nili*, *A. pharoensis*, *A. pretoriensis*, *A. rufipes*, and *A. squamosus* ; other rarer species are mentioned by name only.

In conclusion, notes are given on entomological technique, malaria and anopheline surveys and control. The clear line drawings are very helpful to the beginner as also is the list of selected literature. *H. S. Leeson*

SEN, P. **Diagnostic Characters for the Differentiation of the Larvae of *A. subpictus* and *A. sundaicus*.** *Indian J. Malariology.* 1949, Dec., v. 3, No. 4, 265–8.

HODGKIN, E. P. **On the Dissection of Mosquitoes for Malaria Parasites and the Information to be derived therefrom.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1950, May, v. 43, No. 6, 617–34, 1 fig. [10 refs.]

The following is the author's summary :—

" (1) The purpose of dissecting wild caught anopheles for malaria parasites is discussed relative to the incrimination of vector species, the sporozoite rate, the oocyst rate, and an estimate of the intensity of transmission.

" (2) A series of examples from Malaya and a hypothetical example are given to illustrate certain specific points.

" (3) The practice of keeping mosquitoes for some days between capture and dissection is shown to produce artificial infections. This may result in a species being identified as a vector of malaria when, in fact, it is harmless. It will also produce fictitious sporozoite rates which will invalidate any estimate of the intensity of transmission. Further, any information that is extracted with regard to the biology of the vectors (development of ovaries, feeding habits, etc.) is liable to be invalidated.

" (4) For these reasons it is essential to adopt the rule that all mosquitoes, whether recently engorged or not, be dissected as soon as possible after capture. A maximum of 72 hours is suggested. For studies on the biology of the insects themselves, even this is too long.

" (5) When both the true sporozoite rate and the numbers of the vector species that are attacking man are known, a useful index of the intensity of transmission can be obtained by multiplying the sporozoite rate by the nightly average catch.

" (6) In the series of examples given, the sporozoite rate ranged only between 1·1 per cent. and 0·4 per cent. in the anopheles species *barbirostris*, *letifer*, *maculatus*, and *umbrosus*. In *A. sundaicus* the sporozoite rate was much lower. The index of transmission varied greatly because of the very different numbers of the vector mosquitoes that were caught. Very large catches of *A. sundaicus* resulted in a rate of transmission of the same order as that found in the other species.

" (7) The examples are illustrative of the type of information that is made available by the dissection of wild caught anopheles when proper care is taken in their collection and an estimate is made of the numbers that are likely to bite man. Examined in conjunction with accurate information on malaria in the human population, the index of transmission will give valuable information relative to the biology of malaria.

" (8) Other factors that may affect the conclusions drawn from dissection data are considered briefly. These relate to the time, place, and method of capture of the mosquitoes. The importance is stressed of recording all relevant information in reports if full value is to be obtained from them."

VARGAS, L. **Malaria along the Mexico-United States Border.** *Bull. World Health Organization.* Geneva. 1950, v. 2, No. 4, 611–20, 1 fig. (map) [43 refs.]

The Mexico-United States border lies between 26° and 33° North latitude and from coast to coast is approximately 1,500 miles. Information on malaria

incidence is incomplete. Briefly there is practically no malaria in California and only occasional cases occur along the remainder of the western half of the border territory, including Arizona. Along the eastern half, and following the course of the Rio Grande River, malaria becomes a problem only in the lowlands along the coast of the Mexican Gulf.

The following anophelines have been reported :—

Generalized distribution : *A. punctipennis, A. pseudopunctipennis.*
Western half of the border : *A. maculipennis freeborni.*
Eastern lowlands : *A. albimanus, A. crucians, A. quadrimaculatus, A. walkeri.*

Of minor importance are the brackish-water breeder, *A. bradleyi* and the tree-hole breeder, *A. barberi.*

A. albimanus is a mosquito of hot and humid climates and breeds in fresh or brackish water of all varieties provided there is ample sunlight. *A. quadrimaculatus* prefers variable types of natural fresh water so long as there is abundant aquatic vegetation or debris. *A. freeborni* is commonly associated with irrigation schemes, ricefields, etc., of the interior valleys of the West. These three mosquitoes are important vectors of malaria. *A. pseudopunctipennis* is a vector in some areas and *A. walkeri* is a suspected vector.

A description, in some detail, is given of available data on each of the mosquitoes listed above. *R. Ford Tredre*

Burgess, R. W. & Young, M. D. **The Comparative Susceptibility of** *Anopheles quadrimaculatus* **and** *Anopheles freeborni* **to Infection by** *Plasmodium vivax* **(St. Elizabeth Strain).** *J. National Malaria Soc.* 1950, Sept., v. 9, No. 3, 218–21.

" In a series of 40 comparative feedings involving 3,238 mosquitoes, *Anopheles freeborni* showed a greater susceptibility than *A. quadrimaculatus* to infection by a domestic strain, St. Elizabeth, of *Plasmodium vivax.* Not only was there a higher percentage of mosquitoes infected but the intensity of the infections was greater in the former species."

Sutliff, W. D., Dulaney, Anna D. & Davis, W. L. **Complement Fixation with** *Plasmodium knowlesi* **Antigen for Malaria Diagnosis.** *J. National Malaria Soc.* 1950, Mar., v. 9, No. 1, 75–9.

The effectiveness of the complement-fixation test in the diagnosis of malaria of long standing was investigated in 174 patients of a Veteran's Hospital. As a source of antigens the authors used a phosphate buffer extract of *Plasmodium knowlesi* [this *Bulletin*, 1945, v. 42, 352] with four 50 per cent. units of complement. The sera were tested in dilutions from 1 : 5 to 1 : 160. The patients belonged to 4 groups, those with a history of malaria and differing in the presence or absence of parasitaemia, and those without malaria. In the 1st group, comprising 28 patients with demonstrable parasitaemia (*P. vivax*), out of 35 tests 31 were positive. In the 2nd group of 80 patients, with a history of malaria within one year but without parasitaemia, out of 89 tests only 17 were positive. In the 3rd group of 37 patients with a history of malaria one year or more before examination and in the 4th, in which there was no history of malaria, all the tests were negative. " These results suggest the possible value of the complement fixation test where malaria is indicated but no other positive evidence is found. A positive serological reaction may be a means of detecting malaria in cases of long standing." *C. A. Hoare*

MINISTRY OF TRANSPORT. **Notice to Ships' Surgeons. Suggestions for the Prevention, Diagnosis and Treatment of Malaria.** Notice No. M.333. 30 pp., 6 charts. 1949, June. (Revised 1949, Oct.)

Written primarily for the ship's surgeon, this 30-page booklet is most useful for any doctor unfamiliar with the clinical attack of malaria and its treatment. The classical and easily diagnosed typical attack is briefly described and illustrated by six temperature charts, but stress is laid on the greater frequency of atypical attacks. The various forms of pernicious attack of malignant tertian fever and their mode of onset are noted and reference made also to the peculiarities of malaria in childhood and during pregnancy. An adequate discussion on the problem and methods of diagnosis is followed by detailed notes on the management of the febrile case and modern specific treatment, the drugs being limited to quinine, mepacrine, pamaquin and paludrine [proguanil]. The technique of intravenous and intramuscular injection occupies three pages. At the commencement of the booklet there is quoted a list of precautionary measures to limit as far as possible the ingress of mosquitoes to the ship when in port and the chances of being bitten. Crews in a malarious area should be given prophylactic drugs under official supervision ; paludrine is quoted as the most satisfactory and most effective drug known for this purpose.

[It is perhaps surprising to find quinine included as a drug of practical suppressive value.] *R. Ford Tredre*

BUCCO, G. Su taluni aspetti atipici della perniciosa malarica. [**Some Atypical Manifestations of Subtertian Malaria**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1950, May, v. 31, No. 5, 371–7. [19 refs.]

The English summary appended to the paper is as follows :—

" Description, differential diagnosis, and pathogenesis of a case of malaria (Pl. falciparum) during which pseudo-appendicitis and hysterical-epileptic attacks occurred."

KIKUTH, W. **Progress in Malaria Research.** *J. Roy. Egyptian Med. Ass.* 1950, v. 33, No. 6, 573–84.

A general review.

CHAKRAVORTY, A. & BASU, U. P. **On the Economic Use of Quinine.** *Calcutta Med. J.* 1950, Aug., v. 47, No. 8, 246–8. [14 refs.]

The use of quinine in malaria is still considerable and conditions, particularly in India, make it desirable that the greatest possible degree of economy should be exercised in its utilization.

The authors refer briefly to the literature on quinine metabolism and suggest that as bile salts stimulate the hepatic flow and (it is claimed) tend to keep quinine salts in solution and bile acid enhances the parasiticidal action of the drug, use might be made of these factors, since the highest concentration of quinine is found in the liver.

Dehydrocholic acid—an oxidation product of cholic acid—is stated to have a marked effect on bile secretion and to possess a low toxicity. It is suggested that in the oral administration of quinine, the simultaneous administration of such an effective choleretic is likely to help in the absorption and utilization of quinine, especially where bile secretion is deficient.

Accordingly a drug was prepared from quinine sulphate and dehydrocholic acid, 2½ grains of each. This was marketed in the form of tablets (Quinocholin,

Bengal Immunity Co., Ltd., Calcutta). The tablets disintegrated in a few seconds. The usual dosage was 2 tablets thrice daily for 2 days, and then 1 tablet thrice daily for 3 more days.

Clinical trials have been encouraging. The fever was controlled, but as a precaution against relapse the drug was continued in a course of one tablet twice daily for another 6 days.

No details are given, but these are promised. The authors' purpose in presenting this preliminary note is in order that others may give this type of drug a clinical trial.

The advantages claimed for preparation are quicker absorption, better therapeutic results and less consumption of quinine alkaloid ; the last factor reduces the probability of development of cinchonism and other toxic effects of quinine. *H. J. O'D. Burke-Gaffney*

Bryan, J. F. **A Case History of Infantile Scurvy with Thrombopenic Purpura after Use of Euquinine.** *Med. Bull.* New Jersey. 1948, Apr., v. 8, No. 1, 70–75.

" A case of infantile scurvy has been presented which was unusual in several respects. The age of the child, 24 months, is somewhat older than is common for the onset of this disease. There was no hematuria, which is a very common symptom, often the first symptom. The complete absence of platelets (thrombocytes) could not be considered as part of the syndrome of scurvy. By means of several tests conducted in the convalescent stage, euquinine was definitely incriminated as the causative agent of the thrombopenic purpura which occurred prior to admission to the hospital.

" As quinine hydrochloride also had a very severe thrombopenic effect, it is evident that any of the quinine derivatives may cause a very unfavourable effect upon anyone having or just convalescing from scurvy. Should scurvy and malaria be present concomitantly, the drug of choice for the treatment of malaria should not be a quinine derivative, and atebrin is suggested."

Halawani, A. & Baz, I. I. **A Preliminary Report on the Single-Dose Therapeutic Value of the Antimalarial Drugs in Cases of Benign Tertian Malaria together with a Note on the Prophylactic Action of the same Compounds.** *J. Roy. Egyptian Med. Ass.* 1950, v. 33, No. 6, 604–14.

In this study, 287 patients with benign tertian malaria attending the Khanka Research Station, Egypt, most of whom gave a history of repeated malarial attacks, were divided into 6 groups and treated with a single massive dose of an antimalarial drug. One group [47 patients] received quinine dihydrochloride 2·0 gm., whilst the other five received chloroquine diphosphate (Aralen) [40], camoquine [50], paludrine (proguanil) [50], nivaquine [50] or quinacrine (mepacrine) [50] respectively, the dose in each case being 0·6 gm. of the drug. The results in each group were satisfactory, although proguanil was somewhat slower in action than the other drugs tested. Observations were carried out over a period of 6 months, during which time there were 2 relapses of *vivax* malaria in the quinine group, 5 in the mepacrine group, 6 in the nivaquine group, 4 in the proguanil group, 1 in the camoquine group and none in the chloroquine group.

A prophylactic experiment was carried out among 593 pupils in a reformatory school, who were divided into 5 groups. Four of these received mepacrine [114 patients], camoquine [114], nivaquine [108] or proguanil [143], a single dose of 0·6 gm. being administered weekly in each case over a period of 6 months,

while the fifth group [114 patients] was left untreated as a control. All anti-mosquito work in the area was discontinued during the period of the experiment. The combined incidence of *vivax* malaria among the treated groups was 9 out of 479 [2 per cent.], as against 34 out of 114 [30 per cent.] in that untreated. There were fewer cases of malaria in the proguanil group than in any of the other 3 groups treated, but the difference was not statistically significant. The authors stress that the report is a preliminary one to be supplemented in due course by the results of further studies. *G. Covell*

BRODIE, B. B. & UDENFRIEND, S. **Metabolites of Pamaquine in Urine.** *Proc. Soc. Exper. Biol. & Med.* 1950, Aug., v. 74, No. 4, 845–8, 1 fig. [10 refs.]

The fact that the antimalarial effect exerted by pamaquin is not correlated with the blood concentration [BERLINER *et al.*, this *Bulletin*, 1948, v. 45, 961] and also that the drug fails to act *in vitro* on growing erythrocytic forms, suggested that the substance acted through formation of one or more metabolic products, *cf.* ZUBROD *et. al.* [*ibid.*, 962]. Supporting evidence comes from the fact that haemolysis and methaemoglobin production noted *in vivo* do not occur *in vitro* within therapeutic ranges of concentration. The present authors also noted that urine or plasma from human patients or dogs undergoing treatment with pamaquin gave rise to methaemoglobin in lysed blood and caused haemolysis of intact red cells. Experimental evidence suggested that a single substance was responsible for both reactions. The extraction of this substance from cooled urine at alkaline *p*H resulted in considerable loss. The product had a yellowish colour and a maximum absorption at 460 mμ but could not be further purified. Another metabolite of pamaquin, fluorescent in acid solution with absorption maximum at 250 mμ, was also present in urine and plasma and was stable in acid and alkali but did not have the properties of the above substance. A homologue of pamaquin administered to dogs gave rise to both of the above substances. Failure to obtain the substances in crystalline form owing to the small amounts present, made unequivocal identification difficult, but available evidence suggested that a 5-hydroxy derivative was formed from pamaquin. It appears possible that the first described substance is responsible for the toxic effects of pamaquin, but it has not yet been determined whether it is the active antimalarial agent.

J. D. Fulton

MAEGRAITH, B. G. **Some Controversial Aspects of Malaria Control.** *J. Roy. San. Inst.* 1950, Sept., v. 70, No. 5, 445–8.

In his presidential address to the Tropical Hygiene section of the Health Congress at Eastbourne in 1950, Professor Maegraith dealt with two questions : (*a*) What part does an acquired defence play in individual and group tolerance to repeated malarial infection, and how far must this factor be considered in assessing the results of present-day incomplete methods of control ? (*b*) What are the ultimate effects of complete malaria control on the community likely to be ?

The importance of tissue defence mechanisms is once again emphasized by recent work which has shown that chloromycetin acts on the typhus rickettsia not by directly killing it but by inhibiting its division, thereby permitting the protective mechanisms of the body to deal with the infection. The anti-malarial drugs are plasmocidal so that there has been little regard for the development of bodily resistance when they are utilized. Is it wise to make these drugs so readily available to an indigenous population in an endemic area that individuals fail to develop that form of acquired defence which it is " tacitly

accepted . . . is probably of importance, and perhaps vital importance " ? Or is it better to use drugs for overt attacks only, and so not interfere with the development of a tolerance or immunity by repeated reinfection ? These difficult problems require investigation ; there are indications that, because of successful mosquito control, the loss of an acquired tolerance may expose a person to the most serious effects of malaria if re-infection occurs. The devastating Ceylon epidemic of 1935 is an example ; this followed a long period of adverse climatic conditions for the vector mosquito, virtually a natural control.

" If good continuous control can be established over a wide area, or over an area which is protected by geographical conditions, such as an island like Cyprus, then such control is probably worth accomplishing. On the other hand, I think there is much to be said against localized control in circumscribed areas, for example, ports, surrounded by neighbouring hyperendemic areas over which no control is at present possible."

A grave problem is the increasing population pressure which might be expected to follow reduction in malarial morbidity and mortality. " It seems that sanitary progress should not be allowed to outstrip developments in other directions, such as agriculture and education, up to desirable standards of living. . . . It is not enough to eradicate malaria on the ground that it is a grave preventible disease, and that it is our duty as doctors to ensure its eradication. It is also our duty to ensure that eradication will not bring worse evils in its trend."

[This address is a plea for an investigation of the malarial immunity problem, mainly in Africans, as a preliminary to the extension of malaria control measures, which to date have been limited to localized schemes. Has not past experience shown that sanitary progress precedes improvements in agriculture, education and standards of living ?] *R. Ford Tredre*

EJERCITO, A. **Simplified, Handy and Economical Construction of an Automatic Siphon Sluice for the Control of Stream-Breeding Anopheles, Vectors of Malaria.** *Riv. di Malariologia.* 1950, Aug., v. 29, No. 4, 217–27, 4 figs.

Trial of the Macdonald siphon in the Philippines was satisfactory until such time as the inlet of the galvanized iron pipe of the auxiliary siphon became clogged with algal growth and other debris. Because of this, and the inaccessibility of the siphon sites and the difficulty of transportation of the component parts, the author studied the problem of construction of the siphon and the retaining walls at the site by pouring concrete mix into portable moulds. Three moulds are devised (*a*) for the siphon base and core or weir, (*b*) the core casing, and (*c*) the siphon cover or dome. A detailed description of this method of construction is accompanied by sketch plans. A feature of the construction is the use of " banana stalk " to form the tube which acts as the auxiliary siphon, thus dispensing with galvanized iron piping.

[This paper is well worth consulting by the sanitary engineer who is faced with a similar problem of construction of siphons in places difficult of access.] *R. Ford Tredre*

EICHLER, W. & PAGAST, F. Freilandkontrollen über den Bekämpfungserfolg gegen Larven von Anopheles messeae. [**The Assessment in the Field of the Effectiveness of Control Measures against** *A. messeae* **Larvae.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1950, July, v. 2, No. 1, 106–10.

The following is substantially the authors' summary :—

Checking of control measures against *Anopheles maculipennis messeae* should be done with free-living larvae. Laboratory conditions are not adequate

because the larvae are in unnatural surroundings and may have been damaged in capture : such larvae are more susceptible to stomach poison dusting. In extensive breeding areas many catches before and after dusting should be made, and where the larval population is very dense checks during dusting are recommended.

Four indicators of effectiveness are discussed : the number of dead larvae, the number of moribund larvae, changes in the ratio of the number of anopheline larvae to that of culicines which are not affected by stomach poisons, and the absence of larvae in particular stages. Six examples of the use of such methods are given. *J. H. Sudd*

MISSIROLI, A. **The Control of Domestic Insects in Italy.** *Amer. J. Trop. Med.* 1950, Sept., v. 30, No. 5, 773–83, 4 figs.

" In bygone centuries these tiny creatures spread frightful epidemics of plague, of typhus and of malaria among the peoples of Europe. They have sometimes determined the course of history and decided the destiny of nations." Thirty years ago BERLESE in Italy foresaw that man would effectively control the housefly in the near future, driving it back and destroying it.

The demonstration in 1944 by the Allied Military Government in Italy of the residual insecticide action of DDT, led to renewed ardour in control of adult *Anopheles* ; the following year a controlled experiment in the province of Latina showed that the results attained with residual DDT were alike in the presence or absence of anti-larval measures ; anti-larval measures were therefore superfluous. Similar results were obtained by SOPER and his colleagues. This meant that wherever the *A. maculipennis* group are vectors of malaria adult mosquito control by this method alone will stop transmission of the disease, irrespective of housing conditions. In 1946 it had become possible to formulate a five-year plan for the eradication of this disease, which " had so tragically influenced the destiny of Italy for the last two thousand years." Larval control, mechanical protection, drug prophylaxis and land reclamation were dropped in the new plan. Insect control in Central Italy rid the rural population of mosquitoes, flies, *Phlebotomus* and bugs, thus " attaining the goal of sanitary hygiene, which endeavours not only to protect man against infectious diseases, but also to provide him with better living conditions." Members of the *A. maculipennis* group and *A. superpictus* are very sensitive to the action of DDT and the results attained thus far in the five-year plan enable the author to predict " that malaria is doomed to disappear very soon from the entire Mediterranean basin."

The problem of the appearance of DDT-resistant flies has been met [to date] by the use of the contact insecticide Octa-Klor either alone or in combination with DDT. The author does not think it possible that this resistance is an acquired characteristic consequent upon spraying with DDT, but rather that a DDT-resistant variety had persisted and become predominant. For fly control, concentrated water emulsion solution containing 75 per cent. Octa-Klor and 25 per cent. DDT is applied at the dose of 2 gm. of the combined insecticide per square metre ; thereby the specific action of DDT on *Anopheles* is unaffected.

Statistics of death and birth rates in two neighbouring non-malarious communes are cited in graph form to show that the summer increase in the death rate is due to the transmission of pathogenic germs by domestic insects, and above all by flies. In areas treated with DDT the decided reduction in the death rate in the summer caused the yearly average to fall to about nine to ten per thousand, as low as in the healthiest countries in Northern Europe. *R. Ford Tredre*

Aziz, M. **Extracts from the Annual Report on the Anopheles (Malaria) Eradication Programme for the Year 1949.** *Cyprus Ann. Med. & San. Rep. 1949.* Appendix A & B. pp. 13–16, 1 chart.

The anopheline eradication campaign in Cyprus [see this *Bulletin*, 1950, v. 47, 207] terminated at the end of 1949. The operations during 1949 are said to have been "testing of the effectiveness of eradication work following the discontinuation of larviciding over extensive areas during the height of the normal breeding season, and as dealing with any positive finding through squads of checkers." [This leaves it uncertain exactly how much spraying was done; it appears that 18 tons of DDT were used, as compared with 19½ tons in the 1948 eradication work.]

The checking work was continued on an increased scale for larvae (average 214 scouts, as compared with 143 in 1948) and somewhat decreased scale for adults (average 122 scouts as compared with 176). The scouts found larvae in 34 out of 5½ million breeding places inspected, and adults in 6 out of 1 million adult resting places. Of the 556 blocks into which the island had been divided, 519 (93 per cent.) remained negative throughout the year. The larvae were observed in May to September (especially the latter) and the few adults were discovered in September to November. The mosquitoes found were mainly *A. superpictus*; no *A. elutus* larvae or adults were found.

There were no fresh cases of malaria reported during the year and the total number of relapses was 113. Blood from 275 infants was examined without a single parasite being found. *J. R. Busvine*

Rajendram, S., Cader, M. H. M. A. & Visvalingham, T. **Malaria Eradication in Ceylon.** [Correspondence.] *Nature.* 1950, Sept. 16, 486.

A great reduction of malaria has occurred in Ceylon since the commencement of a general campaign for residual spraying in 1945. *Anopheles culicifacies*, which rests to a great extent in houses, is thought to be the only vector. The authorities are now considering whether they can achieve total eradication of this species. Much would depend on whether *A. culicifacies* breeds only in waters close to human habitations or whether it is also distributed widely in uninhabited areas. In the latter event eradication would be extremely difficult and costly.

Investigations are reported from two areas, in the north-west and south-east of Ceylon: the actual spots investigated were all between two and seven miles from the nearest human habitation. Larvae were searched for in pools in the beds of rivers in the dry season and huts were erected in which mosquitoes which attack man throughout the night were collected. In both these areas considerable numbers of larvae and adults were collected, from which it is concluded that "it is obvious that eradication of this species in Ceylon is not a practical proposition". *P. A. Buxton*

Macdonald, G. **Residual Insecticides in Assam.** [Correspondence.] *Brit. Med. J.* 1950, Aug. 12, 414.

Professor Macdonald records the results of Dr. Alan Gilroy working in Assam, which do not support the conclusions reported by Dr. D. M. Bertram [this *Bulletin*, 1950, v. 47, 814]. The technique of treatment and checking was the same as that of Bertram and the following results were attained at the end of a month of observation.

Treatment (per sq. ft.)	Mosquitoes collected			Mosquitoes in Traps surviving 24 hours
	Dead on Floor	In trap		
		Dead	Alive	
(*a*) All mosquitoes				
10 mgm. *gamma* BHC	134	144	777	66
45 „ DDT ...	13	44	361	47
90 „ „ ...	3	41	245	7
(*b*) Anophelines				
10 mgm. *gamma* BHC	50	59	104	8
45 „ DDT ...	5	33	56	2
90 „ „ ...	0	19	37	2

(The anophelines included 135 *A. minimus* and 17 *A. leucosphyrus*, none of which survived 24 hours.) These results show no greater survival after contact with DDT than with *gamma* BHC. Macdonald concludes that both insecticides probably have value in Assam, and that neither should be discarded without very careful trial. *J. R. Busvine*

Smith, H. F. & Dy, F. J. **Can Malaria be Controlled in the Philippines by DDT Residual Spraying of Houses ?** Reprinted from *Acta Med. Philippina.* 1949, Oct.-Dec., v. 6, No. 2, 81–111, 10 figs. on 5 pls. [12 refs.]

The answer to the question, which is the title of this paper, is " No ". From August 1948, residual spraying of a 5 per cent. DDT emulsion was carried out on four occasions at intervals of 3 months in each of three test areas, which had adjacent unsprayed control areas. The populations at risk were each between 2,000 and 4,000, and the number of houses and out-buildings treated was 1,750. Malariometric data, such as parasite and spleen rates and indices, larva density in the streams and adult mosquito densities in animal-baited mosquito traps and in natural harbourages, were gathered shortly before the application of the residual spray, at certain intervals during the course of the experiment, and at the end of the study which lasted 12 months. These data were obtained in the test and control areas by practically the same trained staff. Great care was exercised in the routine work of insecticide application and checks were made periodically by chemical and biological tests of the DDT deposit, which in the first place was a minimum of 200 mgm. per square foot.

Comparison of the pre-spraying data with those obtained after 12 months showed no significant change in :—

1. The parasite index of subjects 2 to 10 years old in the three test areas.
2. The parasite and spleen rates of subjects 11 years old and above in the three test areas.
3. The spleen index of subjects 2 to 10 years old in two of the three test areas.
4. The average larva density of *A. minimus flavirostris* in two of the three test areas.
5. The average larva density of other anopheline mosquitoes in two of the three test areas.

6. The average density of *A. minimus flavirostris* and other anopheline mosquitoes caught in the natural harbourages in the three test areas.
7. The average density of *A. minimus flavirostris* caught in the traps in one of the test areas.
8. The average density of other anopheline mosquitoes caught in the traps in one of the three test areas.

The authors discuss the apparent failure of the procedure and finally express the opinion that this is most likely due to the wild nature of the vector (*A. minimus flavirostris*) as a consequence of which it does not stay indoors long enough to permit sufficient contact between it and the sprayed surfaces. In addition preliminary observations indicate that the type of building material used in rural Filipino communities does not retain DDT residue as well as wood and other building materials. Detailed data is given in nine tables which form the basis for the conclusions.

[Was the experiment conducted or studied for a long enough period ? The distinguished authors would have preferred two years but in this instance the results are sufficiently clear-cut to warn Health Authorities against complete reliance on the residual insecticide technique for malaria control, without preliminary entomological survey and trials.] *R. Ford Tredre*

Bradley, G. H. & Lyman, F. E. **Discussion of Five Years' Use of DDT Residuals against** *Anopheles quadrimaculatus*. *J. National Malaria Soc.* 1950, June, v. 9, No. 2, 113–18.

The reduction of the malaria hazard by the residual spray programme in the south-eastern United States has been measured during five years (1945–49) in terms of its ability to maintain houses free of *A. quadrimaculatus*. The efficiency of this indoor spraying technique as a means of malaria control is dependent on the habit of the vector of resting and lingering within houses, particularly after a blood meal. A single seasonal application of 200 mgm. of DDT per square foot (2 gm. per sq. metre) is the standard annual dose. Results are assessed by comparison of percentages of random inspected houses found free of *A. quadrimaculatus* in the afternoons. Of the many thousands of houses inspected, an average of 98·3 per cent. of the sprayed and 84 per cent. of the unsprayed were free of the vector over a period of five months. During the four years, 1946–49, one in seventy-four of sprayed houses harboured the mosquito compared to one in six in the unsprayed houses. The tabled data indicates a gradual decrease in effectiveness of the residual DDT during the course of the mosquito season. *R. Ford Tredre*

i. Deane, L. M., Freire, E. P. S., Tabosa, W. & Ledo, J. Aplicação domiciliar de DDT no contrôle da malária em localidades da Amazônia. [**House Spraying with DDT in Malaria Control in Areas in Amazonia.**] *Anais VI Congr. Brasileiro de Hig., Rio de Janeiro, 19 a 25 Outubro, 1947.* 325–58, 9 figs.

ii. Galvão, A. L. A. & Damasceno, R. G. Tempo da ação residual do DDT contra o *Anopheles darlingi*. [**Duration of Residual Action of DDT against** *A. darlingi*.] *Ibid.* 381–5, 1 chart.

iii. da Costa, A. M. & Bassères, M. S. Ação do DDT sôbre o *A. darlingi*, *A. albitarsis* e outros culicideos. [**Action of DDT on** *A. darlingi*, *A. albitarsis* **and other Mosquitoes.**] *Ibid.* 387–94, 1 graph.

iv. Wasicky, R., Unti, O. & Schiavi, A. Ensaios com novos larvicidas—hexachlorobenzeno, DDD, DDT e outros. [**Tests of New Larvicides—Benzene Hexachloride, DDD, DDT and others.**] *Ibid.* 369–79.

These papers deal with various aspects of the use of DDT and other insecticides for anti-malarial programmes.

i. DDT house spraying has been used to control *Anophelese darlingi*, the malaria vector in a number of Brazilian towns, since 1945. Up to 1947, some 7,000 houses had been sprayed with 5 per cent. DDT in kerosene at the rate of 2·1 gm. DDT per square metre. The average house required 24 square metres to be sprayed, which took 25 minutes. Spraying was done every two months.

Good results were indicated by an almost universal decline in spleen and parasite rates (given in some detail). For example, in the town of Breves, parasite and spleen rates were 22 and 45 per cent. respectively, before DDT spraying, 1·5 and 16·8 per cent. one year afterwards and 0·3 and 8·3 per cent. the following year.

ii. In order to determine the duration of residual action of DDT-spraying, mosquitoes (*A. darlingi*) were captured overnight (6 p.m. to 6 a.m.) in a treated house and kept for 48 hours. Similar catches were made at intervals in an untreated house nearby. The controls showed 6 per cent. mortality after 6 hours and 19 per cent. after 24 hours ; this was allowed for in assessing results. Tests at intervals showed that the DDT retained a high lethal action (over 90 per cent.) for 4 months and then declined to zero at about 8 months.

iii. Mosquitoes of the species mentioned were captured at intervals in houses treated in various ways. Records over a period of two years showed that, after treatment with aqueous suspension of DDT (at 3·5 and 2·5 gm. per square metre), 93 per cent. of mosquitoes died, whereas kerosene solution of DDT at the same rates killed 79 per cent., pyrethrum killed 27 per cent. and control deaths were 2·6 per cent.

iv. Laboratory tests were made with various insecticides in alcohol solution added to large volumes of water to give fine suspensions. Larvae of *Culex fatigans* and other culicine and anopheline mosquitoes were used as indicators. In addition, some small field trials were made in naturally infested pools and streams.

The *gamma* BHC isomer was found to be effective at 1 : 100 million and was therefore ten times as larvicidal as DDT ; on the other hand, it appeared to be only one-tenth as toxic to fish and other aquatic organisms. The other isomers of BHC had little or no larvicidal action. The substance DDD (DDT analogue) proved to be almost as active as DDT. *J. R. Busvine*

Jaswant Singh, Ray, A. P. & Nair, C. P. **Transmission Experiments with *P. knowlesi*.** *Indian J. Malariology.* 1949, June–Sept., v. 3, Nos. 2/3, 145–50.

The following is the author's summary :—

"(i) *A. stephensi* and *A. annularis* were experimentally infected with *P. knowlesi*.

(ii) Inoculation of infected glands to clean monkeys produced infection in two out of four animals.

(iii) Sub-inoculation results were successful.

(iv) *P. knowlesi* infection produced experimentally in healthy monkeys after one passage through insect host did not increase the virulence of the parasites which appeared to be even less virulent than before."

MULLIGAN, H. W., SOMMERVILLE, T. & LLOYD, O. C. **Observations on the Infectivity of Tissues of *Macaca mulatta* during the Incubation Period following Exposure to Infection with Sporozoites of *Plasmodium cynomolgi*.** *Indian J. Malariology.* 1949, June–Sept., v. 3, Nos. 2/3, 211–34. [20 refs.]

In the course of an investigation devoted to the search of a pre-erythrocytic phase of *Plasmodium cynomolgi* in *Macaca mulatta*, the authors attempted to determine the site of development of the then hypothetical stages by subinoculating various tissues of an infected animal into clean monkeys at various periods of the incubation period, *i.e.*, in the interval between the introduction of the sporozoites and the appearance of parasites in the blood. The blood of monkeys proved to be infective when subinoculated at intervals up to 45 minutes after subcutaneous injection of numerous sporozoites, which presumably circulate in the blood stream during that period. However, during the remainder of the incubation period, *i.e.*, for 9 days after the injection of sporozoites into the donor, both the blood and all other tissues tested by subinoculation (spleen, liver, bone marrow, lung, kidney, pituitary, brain and suprarenal) failed to produce infection. Subsequently the blood became infective again, even when parasites were not detectable by microscopical examination. On the basis of the discovery of EE stages in monkey malaria by SHORTT and his associates, there seemed little doubt that pre-erythrocytic stages must have been present in the material used by the present authors. Their failure to produce infection in susceptible monkeys is, therefore, in contrast to the findings in avian malaria, in which various tissues were found to be infective during the incubation period and at a time when the blood is non-infective.

C. A. Hoare

ADLER, S., YOELI, M. & ZUCKERMAN, A. **Behaviour of *Plasmodium berghei* in some Rodents.** [Correspondence.] *Nature.* 1950, Sept. 30, 571.

Plasmodium berghei is the first plasmodium found to be infective for rats and mice. The authors in Jerusalem have found *P. berghei* to be infective also for the golden hamster (*Mesocricetus auratus*) and the local field vole (*Microtus guntheri*).

In the hamster a progressive infection occurs which is almost invariably fatal in 8 to 29 days. The final parasitaemia may involve as many as half of the circulating red cells.

P. berghei is not pathogenic for non-splenectomized *M. guntheri* : it produces a patent infection lasting about a fortnight and involving 0·3 to 10 per cent. of red cells (exceptionally 30 per cent.). The infection then becomes latent, though occasional parasites are rarely found in blood smears. During the latent phase, parasites can be found by inoculation of blood or macerated spleen or liver into susceptible animals ; they can also be demonstrated by splenectomy which is usually followed by high and fatal parasitaemia.

H. J. O'D. Burke-Gaffney

THURSTON, June P. **Action of Proguanil on *P. berghei*. Inhibition by *p*-Aminobenzoic Acid.** *Lancet.* 1950, Sept. 30, 438.

The action of sulphonamides and proguanil on plasmodia is related in some way as judged by the morphological changes the drugs produce and by the fact that there is some degree of cross-resistance in strains rendered fast to these substances. Whereas in the case of *Plasmodium gallinaceum* it was found by earlier authors [this *Bulletin*, 1949, v. 46, 119, 1124] that pteroylglutamic acid and *p*-aminobenzoic acid inhibited the action of sulphonamides,

the latter substance did not affect the activity of proguanil. In the present experiments, mice infected with *Plasmodium berghei* were given the minimum effective dose of proguanil or sulphadiazine by mouth followed immediately afterwards by either of the above two substances. The course of the infection was followed in stained films. It was found that *p*-aminobenzoic acid but not pteroylglutamic acid inhibited the action of proguanil. This is the reverse of the findings of earlier authors noted above. Both substances, however, inhibited the action of sulphadiazine on *P. berghei*. [The significance of the contrasting results obtained with two different species of plasmodia is obscure.]

J. D. Fulton

Becker, E. R. **The Response of White Pekin Ducklings infected with *Plasmodium lophurae* to Injections of Plasma from Recovered Ducks.** *J. National Malaria Soc.* 1950, Sept., v. 9, No. 3, 214–17.

Ducklings 11–14 days old were inoculated with measured amounts of blood infected with *Plasmodium lophurae*. The birds also received daily intravenous injections of plasma from half-grown ducks which had recovered from the infection. As controls, other infected ducklings received (i) physiological saline, (ii) normal duck plasma or (iii) rat plasma. The results were anomalous in that injections of both normal and immune duck plasma caused a lowering of the parasitaemia in some of the tests, though not in all. The author suggests that the duckling is too susceptible to the infection for the relatively minor protective power of the plasma to be able to show itself ; in the less susceptible chicken the effect of immune plasma is more consistently shown (see *Iowa State College J. Sci.*, 1949, v. 23, 323). *P. C. C. Garnham*

Meyer, H. Cultivo de " Plasmodium gallinaceum " em culturas de tecido a partir de sangue infectado. II. [**Tissue-culture of *P. gallinaceum* initiated from Infected Blood.**] *Rev. Brasileira Biologia.* 1949, June, v. 9, No. 2, 211–16, 8 figs. (4 coloured) on 2 pls. English summary.

The author describes the behaviour of the erythrocytic forms of *P. gallinaceum* in the brain of chick embryos after the inoculation of heavily infected chicken blood. The culture succeeded only when there was also an infection of the reticulo-endothelial system in the donor. Hence it is concluded that only exoerythrocytic forms which had found their way into the blood of the donor established themselves successfully in tissue-culture. *C. A. Hoare*

Akins, H. **A Method of infecting *Aedes aegypti* with *Plasmodium gallinaceum* from Chick Embryos.** *J. National Malaria Soc.* 1950, Sept., v. 9, No. 3, 248.

For this technique chick embryos, 18 to 19 days old and infected with *P. gallinaceum*, were used. The air sac end of the egg shell was painted with iodine and the piece of shell was broken and removed, together with the outer shell membrane, to expose a major portion of the inner membrane lining the air sac.

The equipment used in the insectary was similar to that described by Johnson [this *Bulletin*, 1948, v. 45, 309] with one modification. Two sheets of rubber dam were placed over the top of a glass lantern globe : each sheet had a central slit 1½ inches long and these openings were set at right angles to each other. One hundred 6-day-old *Aëdes aegypti*, starved for 24 hours, were placed in the globe and the infected egg gently forced through the openings in the rubber dam so that the mosquitoes had free access to the

veins beneath the shell membrane. Chilling of the embryo was prevented by the use of a 60-watt electric bulb placed a short distance above the egg. In these conditions, the embryo usually survived 2 hours' exposure in a room at 75+3°F. with relative humidity of 70 to 75 per cent.

If the embryo is expected to live for more than 24 hours (as judged by the parasitaemia) and later feeding is contemplated, an initial exposure to mosquitoes outside the incubator in excess of 1 hour is not recommended : in such cases, the exposed membrane should be covered with a sterile half egg-shell and the embryo should be returned to the incubator as soon as possible. The author has found that, with the use of this method, 40 to 50 per cent. of the mosquitoes will become engorged in 1½ hours : as many as 80 to 100 per cent. subsequently show sporozoites. *H. J. O'D. Burke-Gaffney*

Drucker, Ilse. Die Wirkung von Atebrin und Resochin auf die Blutformen verschiedener Vogelmalariaarten. [**The Action of Atebrin (Mepacrine) and Resochin (Chloroquine) on the Blood Forms of Different Species of Avian Malaria Parasites.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1950, Sept., v. 2, No. 2, 262–79, 7 figs. [30 refs.]

The action of atebrin [quinacrine, mepacrine] on bird and human malaria parasites has been described [this *Bulletin*, 1932, v. 29, 705 ; 1935, v. 32, 110, 419]. Resochin [aralen, chloroquine] was first synthesized in Germany and developed in the U.S.A. during the second world war. Like atebrin it is not a causal prophylactic but has marked schizonticidal properties, is well tolerated and does not colour the skin. The morphological changes produced in parasites have not yet been described. In order to compare the effects of these drugs on the blood forms of *P. cathemerium* in canaries and on *P. gallinaceum* in chickens, ten of each bird species were inoculated. Four were treated with each drug and two served as controls. The course of the normal infection was followed in stained smears taken at frequent intervals over a period of days. The drugs were administered by rubber catheter to canaries as in the Roehl method in dosage of 5 mgm. per 20 gm. bird in the case of atebrin and 0·75 mgm. for resochin, in single doses or once or twice daily for several days. In the case of chickens the dosage per 50 gm. bird was 0·5 mgm. of resochin or 3·2 mgm. atebrin given into the crop. The infections with *P. cathemerium* with a developmental cycle of 24 hours were more synchronous than those with *P. gallinaceum* which has a period of development in the chick of 36 hours. The course of infections at intervals after drug treatment was followed as above. In the case of *P. cathemerium* marked changes were observed in 5 hours after the administration of atebrin, when the parasites appeared to shrink, round off, lose pigment, and become vacuolated and there was an alteration in staining reactions. Those parasites undergoing nuclear division were specially sensitive to atebrin and the blood was finally freed of parasites. After administration of resochin, in parasites in the early stages of division, the most marked feature was occurrence of vacuolation and nuclear division was retarded. This latter drug appeared to act similarly on all stages of development. Atebrin, however, was more active against dividing forms than against merozoites, and made the blood negative more quickly. Because of the asynchronous type of infection in *P. gallinaceum* the action of the drugs on different forms was not so easy to follow. The changes occurred more slowly than in *P. cathemerium* and with atebrin were less marked. Normal and degenerate forms sometimes occurred together. Resochin appeared to act more quickly. Thus the effects of the two drugs were somewhat different as regards time of appearance and nature of the morphological changes. Both caused vacuolation in merozoites, but in dividing forms this change was more

noticeable after resochin and was accompanied by others described above. The changes produced were of comparable character in both species of *Plasmodium*. *J. D. Fulton*

TRYPANOSOMIASIS

WEINMAN, D. **The Trypanosomiases of Man.** Reprinted from *Oxford Medicine*. 1950, v. 5, Chapter 35, 835–60, 860(1)–860(107), 20 figs. [193+121 refs.]

The paper is in two parts ; the first deals with African sleeping sickness and the second with Chagas's disease. Each is a good textbook account and fully summarizes present knowledge and views on the subject and its associated problems. The history, geographical distribution and clinical and pathological descriptions are followed by accounts of the trypanosomes and the drugs used in treatment. The transmission by the arthropod vectors is dealt with next and finally the epidemiology and methods of control. Recent research receives adequate mention and important controversial questions about the control of African sleeping sickness are impartially stated. The two papers should be valuable to the new student of tropical diseases and convenient for reference for those more familiar with the subject. Some of the illustrations are poor, especially the two maps in the first part, which are almost illegible.

J. F. Corson

LEWIS, D. J. **The Tsetse Fly Problem in the Anglo-Egyptian Sudan.** Reprinted from *Sudan Notes & Records*. 1949, v. 30, Pt. 2, 179–210, 4 maps (1 folding). [Numerous refs.]

Much of this summary is based on works already published of which the author gives more than 130 titles in his list of references.

Distribution records of seven species of *Glossina* are discussed and shown on a large folding map. *G. morsitans* occurs in the main tsetse area in the south-west ; this species has also survived in the Koalib Hills, in spite of the disappearance of big game ; *G. palpalis* ssp. *fuscipes* lives along the stream beds in the main area ; *G. fuscipleuris* and *G. fusca* occur near the Nile-Congo Divide ; *G. longipennis* is recorded in the arid country east of the Nile and *G. tachinoides* is reported from one place in the east ; the author speculates on the past history of this last species to account for the 1,000 mile gap which so far as we know occurs in its distribution and reaches from the interior of French Equatorial Africa to the border of Ethiopia. Lastly, *G. pallidipes* has been found four times in the south-east.

The author briefly discusses the records of bovine trypanosomiasis in areas believed to be free of tsetse flies. *Trypanosoma congolense* is widespread along the Upper Nile in the absence of tsetse and in 1946–47 thousands of cattle died from this infection. It is impossible to find out exactly how much trypanosomiasis is acquired in the tsetse areas and how much outside, but it is certain that a great many animals become infected beyond the tsetse country.

The increase and spread of human trypanosomiasis has been checked by intense effort under very difficult conditions. During the years 1926 to 1945 the average number of detected cases in the Sudan was 66 and the maximum 150 ; but the expense and loss of time incurred by administrative, medical and public health staffs and by the people in arranging inspections and the other

measures are very great. The present need is for an inexpensive form of local control which could be easily enforced and supervised.

A key is given for the provisional identification of the Sudan species of *Glossina* in the field. *H. S. Leeson*

MALLET, R. Prophylaxie et traitement récents de la trypanosomiase humaine. **Present Treatment and Prophylaxis of Human Trypanosomiasis.** *J. Méd. de Bordeaux.* 1950, Oct., v. 127, No. 10, 654–63.

A general review.

SPINKS, A. **Determination of Antrycide.** *Biochem. J.* 1950, Sept., v. 47, No. 3, 299–306, 8 figs. [17 refs.]

LEISHMANIASIS

SEN GUPTA, P. C. **Treatment of Kala-Azar with Methyl Glucamine Antimoniate.** *Indian Med. Gaz.* 1950, July, v. 85, No. 7, 291–6. [15 refs.]

N-methyl glucamine antimoniate (MGA) or Glucantime (R.P.2168) is a pentavalent antimony compound of low toxicity, namely an m.l.d. of 1,500 mgm. per kgm. in mice. It has been used mainly in the treatment of Mediterranean kala azar. The author used this drug in two groups of patients—19 Indian patients in hospital and 5 out-door patients who did not complete the full course.

Of the first group 5 were " resistant " cases : the ages of the patients were between 6 and 46 years, and all but 4 were males. The drug was given intramuscularly in a 30 per cent. solution. Maximum doses were 15 ml. for an adult and 5 ml. to 10 ml. for children ; the total doses were from 87·5 to 215 ml. in adults and from 82·5 to 145 ml. in children. The mean relative dose (per 100 lb. of body weight) was 181·36 ml. and 319·8 ml. in adults and children, respectively. No ill-effects were noted.

The immediate result of treatment was satisfactory in 14 ordinary and in 3 resistant cases ; in 2 resistant cases the drug was ineffective.

A follow-up enquiry or examination was carried out in 11 cases ; only one patient was reported as having relapsed and having had further treatment.

The 5 out-patients were treated with injections twice a week ; the total dosage was from 55 ml. to 155 ml. There was early clinical improvement and all were discharged as cured. It is as yet too early for a follow-up examination. *L. E. Napier*

HERTIG, M. **Observations on the Density of Phlebotomus Populations following DDT Campaigns.** *Bull. World Health Organization.* Geneva. 1950, v. 2, No. 4, 621–8. [10 refs.]

In several regions of the Mediterranean, residual house spray with DDT has been used on a large scale as an anti-malarial measure, each year since 1946. Many of these regions were formerly known to be heavily infested with various sandflies of the genus *Phlebotomus* which caused continual discomfort to the inhabitants and also spread leishmaniasis and sandfly fever. In some areas there had been systematic studies of these insects. In Greece, for example, the dominant species was known to be *P. papatasi*, while *P. major* and *P. sergenti* were also common. Similarly, there are detailed records of the abundance of sandflies in Crete.

The author visited the Mediterranean in 1948, and made careful inspections of houses for sandflies, in Greece (Athens, its suburbs and villages in Attica) Crete (Canea), Italy (a region in the Abruzzi) and Sardinia.

In all places the same picture was presented. There was a great reduction of sandflies in houses treated with DDT (both in relation to earlier scientific accounts and to the descriptions of the inhabitants). Sandflies were still present in numbers in untreated villages ; and in non-malarious towns, where intermittent spraying had been done, the distribution of the flies was patchy.

In Crete, there had been great reduction in kala azar and oriental sore since 1946 (but the former benefit was probably due to reduction of the stray dog population during and just after the war). *J. R. Busvine*

FEVERS OF THE TYPHUS GROUP

FELIX, A. **Standardization of Serological Tests for the Diagnosis of the Typhus Group of Fevers.** *Bull. World Health Organization.* Geneva. 1950, v. 2, No. 4, 637–42. [18 refs.]

This is a note submitted in May, 1949, to the Expert Committee on Biological Standardization of the World Health Organization. The Committee accepted the proposal contained in the note and decided that three standard antisera should be prepared from horses for the standardization of agglutinating suspensions of *Proteus OX19, P. OXK* and *P. OX2.*

The sera are to be tested in laboratories of six countries for their suitability as international standard preparations.

Also, " interested workers will be asked for their opinion about the desirability of standard antisera for specifying rickettsial suspensions ".

The author has rendered a valuable service to everyone who makes use of the Weil-Felix group of tests, which, despite their limitations, are firmly established as valuable aids to diagnosis of the fevers of the typhus group.

The author points out that the rickettsia-agglutination and complement-fixation tests have one advantage in making it possible to arrive at a differential diagnosis of certain fevers of the typhus group which cannot be distinguished from each other by the Weil-Felix test, but he states that the rickettsial tests have the following disadvantages : (1) In the majority of cases they become positive five or six days later than the Weil-Felix test ; (2) The complement-fixation reaction often remains positive for months or even years so that the test is of much less value in retrospective diagnosis than the Weil-Felix test, which usually becomes negative within a few weeks or months after the attack ; (3) Anomalous reactions occur in persons who have been inoculated with " epidemic-typhus " vaccine and afterwards are attacked by murine typhus ; (4) In rickettsialpox and Rocky Mountain spotted fever the complement-fixation test is positive with the antigens of *Rickettsia akari* and *R. rickettsi*, whereas the Weil-Felix test is always negative in rickettsialpox and so differentiates between the two diseases ; (5) In scrub typhus the complement-fixation test gives quite different results with different strains of infection, whereas the *Proteus OXK* reaction is uniformly positive with all strains ; (6) Purified rickettsial antigens are very difficult to prepare and the tests are not easy to carry out.

For these reasons the Weil-Felix test remains the only one available for routine purposes and the rickettsial antigens supplement rather than supplant the *Proteus OX* antigens.

The author states that " it is quite erroneous to designate the reactions with *Proteus OX* antigens as ' non-specific ' and those with rickettsial antigens as ' specific ', as most bacteriologists still do. The heat-stable rickettsial ' O ' antigens, which correspond to the *Proteus OX* antigens, are major antigenic components of the rickettsiae. The rickettsial ' O ' antibody produced in the course of typhus infection is therefore, from the immunological point of view, as ' specific ' as the antibody produced in response to the heat-labile antigens of rickettsiae . . . The rickettsial ' O ' antibodies are demonstrated in the simplest and most reliable manner by the use of the corresponding *OX* antigens."

[It seems likely that when bacteriologists refer to the *Proteus OX* antigens as " non-specific " the reference is to the fact that these antigens are not derived from the specific causative organisms of the disease, but it also appears that in certain conditions the *OX* antigens may give more specific indications of the type of the disease than do the rickettsial antigens employed in the tests. For example, as stated by the author, the Weil-Felix reaction differentiates rickettsialpox from Rocky Mountain spotted fever whereas the complement-fixation test with rickettsial antigens fails to do so. It is also known that the complement-fixing antigens sometimes give indications which are not in harmony with the results of immunity tests, and that even the immunity tests are sometimes difficult to interpret. Standardization of all the tests is greatly to be desired but even this will not solve all the problems of diagnosis unless a set of standardized antigens can be found, each of which will give harmonious results with the different strains of a particular rickettsia.]

John W. D. Megaw

Brisou, J. Le diagnostic biologique des Rickettsioses. [**Biological Diagnosis of Rickettsial Diseases.**] *J. Méd. de Bordeaux.* 1950, Oct., v. 127, No. 10, 646–54. [14 refs.]

A general account.

Previtera, G. & Condorelli, V. Studio di un ceppo di *Rickettsia mooseri* della Sicilia orientale coltivato su sacco vitellino di embrione di pollo. [**Study of a Strain of *Rickettsia mooseri* from East Sicily, cultivated in the Yolk Sac of an Embryo Chick.**] *Acta Med. Italica.* 1950, Aug., v. 5, No. 8, 260–65, 1 fig. [19 refs.] English summary (8 lines).

Jones, B. M. **The Penetration of the Host Tissue by the Harvest Mite, *Trombicula autumnalis* Shaw.** *Parasitology.* 1950, Oct., v. 40, Nos. 3/4, 247–60, 10 figs. [20 refs.]

The larvae of *Trombicula autumnalis* do not suck either blood or lymph. Their food consists of the partly digested cells of the malpighian layer of the host's skin suspended in the intercellular fluid of that layer. In feeding the mite rotates the claw of its chelicerae so that their points are directed dorsally, and inserts them through the horny layer of the host's skin by movements of the whole chelicera. After insertion the claws may be rotated a little so as to part them more. Saliva is injected into the wound through the oral recess of the mite, which lies between and ventrally to the bases of the chelicerae. The action of the saliva is two-fold. It has an irritant effect on the cells of the malpighian layer, which in the first place induces them to seal the oral recess of the mite to the wound with keratinization. The saliva also causes disintegration of the cells of the malpighian layer. It is to the saliva that the inflammation of the host's skin is due ; since this inflammation causes an increased production of intercellular fluid it is of use to the mite. When the oral recess of the mite

is sealed to the wound, it is able to eject saliva into the wound, and to suck back the products of digestion with considerable force. Since it ejects and sucks alternately, the effect is the progressive digestion and removal of the malpighian layer, in the form of a tube, which in some cases is longer than the larva itself. Because of the irritant effect of the saliva this tube becomes surrounded with keratinous tissue and forms the unique stylostome or histiosiphon.

It will be realized that the repeated ejection of saliva in this way over a period of 3–5 days affords an excellent means of transmission for scrub typhus, as the process of feeding is presumably similar in the South-East Asian mites.

J. H. Sudd

SWAMY, T. V. **Laboratory Diagnosis of Scrub Typhus.** *Indian Med. Gaz.* 1950, July, v. 85, No. 7, 297–8.

CANNOO, J. M. Een geval van scrubtyphus ? [**A Case of Scrub Typhus ?**] *Nederl. Tijdschr. v. Geneesk.* 1950, Sept. 30, v. 94 (iii), No. 39, 2811–15, 1 chart.

The English summary appended to the paper is as follows :—

" A case of presumable ' Scrub typhus ', in which the abnormal course of the disease and the capricious fever curve are remarkable."

BARTONE, L. Raro caso di febbre bottonosa con pleurite emorragica de flebite osservato in Cirenaica. [**A Rare Case of Boutonneuse Fever with Haemorrhagic Pleurisy and Phlebitis observed in Cyrenaica.**] *Acta Med. Italica.* 1950, Aug., v. 5, No. 8, 266–70, 1 chart. English summary (6 lines).

The author describes a case which was something of a problem. The Weil-Felix reaction became positive for the first time on the 11th day ; the *Proteus OX19* titre rose to 1–1,000 and fell to zero after about seven weeks. There was a papulo-nodular rash which appeared " relatively late " ; it extended to the limbs and became petechial. There was no *tache noire*, but some authors are said to have observed this in as few as 30 per cent. of the cases of boutonneuse fever, whereas others state that it occurs in 60 to 90 per cent.

The causes of the haemorrhagic pleurisy and phlebitis of the left femoral vein are discussed at some length.

Infection is believed to have been transmitted by the bite of the dog tick, *Rhipicephalus sanguineus*, and the case is regarded as confirming the occurrence in Cyrenaica of the boutonneuse type of tick-borne typhus exanthematicus.

John W. D. Megaw

DE RODANICHE, Enid C. & RODANICHE, A. **Spotted Fever in Panama ; Isolation of the Etiologic Agent from a Fatal Case.** *Amer. J. Trop. Med.* 1950, July, v. 30, No. 4, 511–17. [10 refs.]

A strain of *Rickettsia rickettsi* was isolated from a Negro farmer, resident of the town of Chorrera in Panama, who died 12 hours after admission to hospital. There was a history of fever with bilious vomiting and jaundice for eight days before admission, and yellow fever was suspected.

Serum and suspensions of liver, spleen, and cerebral tissue were inoculated intracerebrally into white mice which remained healthy.

The rickettsiae were isolated from yolk-sac cultures of the fourth passage made from the serum of a *Macacus rhesus* monkey which had been inoculated with a mixture of blood and tissue suspensions obtained from the dead body

of the patient. The yolk-sac cultures were maintained through 16 passages up to date, and guineapigs inoculated with them died almost invariably within eight or nine days.

Another monkey inoculated with serum of the patient, drawn before death, recovered after an attack of fever lasting five days. The serum of this animal gave a Weil-Felix reaction up to a titre of 1–160 against *Proteus OX19*, but a negative reaction against *P.OX2* ; it also gave a complement-fixation reaction up to a titre of 1–512 with rickettsialpox antigen, which was used because Rocky Mountain spotted fever antigen was not available. Dr. R. J. Huebner who supplied the antigen is quoted as stating that " there is little or no serological difference between the two antigens (rickettsialpox and Rocky Mountain spotted fever) as they are ordinarily prepared ". The complement-fixation reactions with murine and epidemic typhus and Q fever antigens remained negative.

This is stated to be the first definite identification of spotted fever [of the Rocky Mountain type] on the Isthmus of Panama.

Three months later a strain of *R. rickettsi* similar in all respects to the above was isolated from a patient from the same locality. *John W. D. Megaw*

DE MAGALHÃES, O. Percentagem dos carrapatos portadores, na natureza, das raças V.B., $V.A._1$ e $V.A._2$ do tifo exantemático neotrópico no Brasil. (Nota prévia.) [**Percentages of Ticks naturally infected with Strains V.B., V.A.1 and V.A.2 of the Neotropical Exanthematic Typhus of Brazil.**] *Brasil-Medico*. 1950, June & July, v. 64, Nos. 22/30, 85–6.

The author inoculated 60 guineapigs with 60 lots, totalling 1,034, of ticks (nearly all *Amblyomma cajennense*) collected in foci of infection of tick-borne typhus in Brazil. Strain V.B. was isolated from 0·5 per cent. of the ticks ; strain V.A.1 from 0·1 per cent. Strain V.A.2 had previously been isolated from man, dogs, cats, and bed-bugs. *John W. D. Megaw*

DE MAGALHÃES, O. Profilaxia do tifo exantemático neotrópico no Brasil. [**Prophylaxis of Neotropical Exanthematic Typhus in Brazil.**] *Mem. Inst. Oswaldo Cruz*. 1949, Mar.–June, v. 47, Nos. 1/2, 249–59. [English version 261–71.]

The author frankly admits the failure of the efforts initiated by himself and others to control the fatal tick-borne fever of the typhus group which occurs in various places in Brazil.

Enactments by the Municipal Councils of Belo Horizonte, the capital of Minas Gerais, and São Paulo are quoted but effect was given to these in so half-hearted a manner that they had no appreciable result.

In the paper it is stated that outbreaks of the disease affecting several members of households are due chiefly to transmission by bed-bugs, though ticks may to some extent be responsible. *John W. D. Megaw*

SIDKY, M. M. **Epidemiology of Q Fever.** *Bull. World Health Organization*. Geneva. 1950, v. 2, No. 4, 563–79. [84 refs.]

It is impossible in an abstract to do justice to this valuable paper which itself is a clear and concise summary of the history of research into Q(uery) fever, starting from the discovery of the disease by DERRICK in 1937.

The summary is based on a study of no less than 84 articles, published up to the early months of 1949, to which references are given in the bibliography attached to the paper. *John W. D. Megaw*

PAYZIN, S. Q hummasina karşi aşi ve müessiriyet deneyleri. [**Animal Experiments on Q Fever Vaccine.**] *Türk Ijiyen ve Tecrübî Biyoloji Dergisi.* Ankara. 1950, v. 10, No. 1, 16–19. English summary 20–21.

The author has prepared two types of Q fever vaccine and tested them on guineapigs, (*a*) a crude vaccine prepared from ground yolk sacs in formal saline and (*b*) a purified vaccine prepared from crude vaccine extracted with ether. In the latter case, after the lipoid fraction had been discarded, the remaining watery suspension of rickettsiae was centrifuged at 1,500 r.p.m. for 15 minutes and the resultant supernatant fluid at 5,000 r.p.m. for 2 hours. The deposited rickettsiae were re-suspended in fresh saline to obtain 1 : 5 of the original volume. The finished vaccines were diluted 1/10 to 1/100 with saline.

For each dilution of each vaccine, 0·5 cc. was inoculated intraperitoneally into five guineapigs. The guineapigs and controls were challenged with 10 m.l.d. of the Morocco strain of *C. burneti*. The results, which are given in a table, indicate that the crude vaccine had some protective effect at a dilution of 1/20 : the purified vaccine was slightly better.

It is suggested that a purified vaccine may be useful to protect staffs of slaughter-houses, dairies and laboratories. *H. J. O'D. Burke-Gaffney*

TITIZ, I. & ERKIP, H. Agir seyretmiş olan bir " Q hummasi " vakasi. [**A Severe Case of Q Fever.**] *Türk Ijiyen ve Tecrübî Biyoloji Dergisi.* Ankara. 1950, v. 10, No. 1, 7–13, 5 figs. on 4 pls. [16 refs.] French summary 14–15.

In Turkey, Q fever occurs principally in the neighbourhood of Konya, Ankara, Istanbul and Izmir, either in endemic or sporadic form. It is usually relatively mild and recovery takes place in 10 to 15 days.

The authors now record a case which was severe from the outset. It suggested bronchopneumonia and there was considerable dyspnoea, cyanosis and collapse. There were crepitations in the lungs and some dullness at the left base. Despite these physical signs, the radiological picture was more or less normal. The disease continued for 27 days, after which improvement set in slowly.

The diagnosis of Q fever was made by complement fixation and identification of *Rickettsia burneti* in the spleen of an infected guineapig. The Neil-Mooser reaction was positive.

The authors stress the importance of bearing Q fever in mind in all refractory cases of pulmonary involvement and of making the appropriate serological investigations. *H. J. O'D. Burke-Gaffney*

YELLOW FEVER

WORLD HEALTH ORGANIZATION. TECHNICAL REPORT SER. NO. 19. **Yellow Fever Panel. Report on the First Session. Geneva, 1–6 December 1949.** 9 pp. Geneva : 1950, Aug. [9*d.* ; $0·10.]

A report of the first meeting of the Yellow Fever Panel, composed of six members with special experience in the epidemiology of the disease. This meeting was held in Geneva from 1 to 6 December, 1949, first as a separate body and later in joint session with the Expert Committee on International Epidemiology and Quarantine.

The delineation of endemic yellow fever areas in America and Africa was the first problem to be studied and various recommendations are put forward.

As regards America it is considered that the 1946 U.N.R.R.A. delineation [this *Bulletin*, 1946, v. 43, 124, 1135] should be maintained with three exceptions : (1) The continued exclusion from the " endemic " area of Belem, Brazil ; Cayenne, French Guiana ; Paramaribo, Surinam ; Georgetown, British Guiana ; the Caribbean ports of Colombia and Venezuela ; and Caracas, Venezuela. (2) That Manaos, Brazil, be excluded from the endemic area. These and all other exclusions are contingent on the maintenance of an *Aëdes aegypti* index not exceeding one per cent. (3) It is recommended that the rural areas of the Republic of Panama and of the Canal Zone be included in the " endemic " area. (The ports of both these regions are excluded.)

With regard to Africa it is recommended that the territory of the French Somali Coast, including Djibouti, be excluded from the " endemic " area originally delineated by U.N.R.R.A., also Massawa in Eritrea, and an area 10 km. radius from Asmara. The following should be added to the " endemic " area ; Nyasaland and the territory to the South of Barotseland lying between 23rd and 25th E meridians of longitude down to the 21st South parallel of latitude. In Africa also the exclusions are contingent on the maintenance of an *Aëdes aegypti* index below 1 per cent.

The criteria for the determination of yellow-fever " endemic " areas are based in America on reports of clinical cases, routine viscerotomy and immunity surveys, and low *Aëdes aegypti* indices. As regards Africa, they are mainly the result of immunity surveys.

The *Aëdes aegypti* index is defined as the percentage of dwellings in which larvae are found breeding. Yellow-fever areas include enzootic regions free from *A. aegypti* and in which the virus is present and persists among animals ; epizootic areas, also free from *A. aegypti* and in which the disease occurs periodically among animals for short periods of time ; endemic areas, with *A. aegypti* and in which virus is present and persists among animals ; epidemic areas, in which human cases caused by transmission of the virus by *A. aegypti* are found.

The measures recommended for the international control of yellow fever, include those concerning sanitary conditions at airports, others applicable to aircraft, ships and other vehicles, and measures applicable to travellers, including crew. These follow the usual lines, but a recommendation that all travellers leaving endemic or epidemic yellow fever areas should be in possession of a valid certificate of inoculation against the disease, or have undergone quarantine detention for 6 days, was not accepted by the Expert Committee on International Epidemiology and Quarantine.

It was stated that where *Aëdes aegypti* exists health authorities of international ports and airports should report the index to W. H. O. quarterly by airmail. The importance of eradicating this mosquito was stressed and it was recommended that W. H. O. should be prepared to render technical and financial assistance to the health administrations concerned.

Finally the experts agreed on the desirability of the co-ordination by W. H. O. of all yellow fever research. *E. Hindle*

Kumm, H. W. **Seasonal Variations in Rainfall : Prevalence of *Haemagogus* and Incidence of Jungle Yellow Fever in Brazil and Colombia.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1950, May, v. 43, No. 6, 673-82, 1 graph & 2 maps.

The occurence of yellow fever in the absence of *Aëdes aegypti* was first noted in Brazil in 1933 [this *Bulletin*, 1937, v. 31, 77]. Since then there have been 1,224 fatal cases in Brazil. The affected area may be divided into those parts of the country covered by Amazonian rain forest and those more sparsely forested.

In the former, jungle yellow fever occurs throughout the year with modes in January and July. In the more sparsely forested areas of Brazil, cases of yellow fever are recorded as starting in November, and are most numerous in February. The November–June outbreaks were epidemic in the years 1934–40 and 1944–45. The recurrence of cases each year in the same localities is suggestive. No fatalities have been recorded in the period July–October. In Colombia, 468 liver specimens positive for yellow fever have been recorded during the years 1934–47. Although the areas involved in Colombia are divided by the Eastern Cordillera of the Andes, the seasonal incidence is the same in both parts : bimodal in July and December.

The author shows that in the sparsely forested areas of Brazil, the greatest incidence of jungle yellow fever is simultaneous with an increase in the number of adult *Haemagogus* caught, and with the highest monthly averages of rainfall. The same is true of the July mode of yellow fever in Colombia, and perhaps the December mode is associated with the forest clearing which the local inhabitants usually undertake in November and December. This brings them in closer contact with forest areas at this time. In the rain forest areas of Brazil the maximum rainfall occurs from January to May, being greatest in March. No figures for *Haemagogus* catches are given for these areas. The greatest incidence of yellow fever does not occur until May, and this may be associated with nut-pickers in this period climbing into the forest canopy, where *Haemagogus* is abundant. There is no apparent explanation of the secondary mode in December and January.

The author does not think it correct to state that any particular areas are continuously endemic, and others subject to periodic epidemics. The true position is that outbreaks of human jungle yellow fever occur more frequently in some areas than in others. *J. H. Sudd*

RABIES

World Health Organization. Technical Report Ser. No. 28. **Expert Committee on Rabies. Report on the First Session. Geneva, 17–22 April 1950.** 26 pp., 1 map. 1950. Nov. [1*s.* 6*d.* ; $0·20.]

The more important recent advances in the field are listed. They comprise the introduction of the mouse as an experimental animal, which has permitted the development of quantitative potency tests, which in turn have permitted the checking of vaccines at all stages of their production and the elimination of interfering factors. U.V. [ultra-violet light] irradiated vaccines have been shown to be of uniformly high antigenicity and are to be included in the list of acceptable vaccines. The possibility of propagating the virus in chick embryos has led to the development of a promising vaccine for veterinary use containing live virus (Flury). Hyperimmune anti-rabies serum, when combined with vaccine treatment, holds great promise for the prevention of rabies in man. New vectors of rabies virus have been discovered, namely the Viverridae family in South Africa and the vampire bats in Central and South America. The latter have been demonstrated to constitute at times asymptomatic carriers. Finally, the development of techniques to study paralysis-producing factors and the devising of means of removing these from rabies vaccines are mentioned.

In discussing the importance of virus strains for vaccine production, the Committee, although recognizing the variations occurring in the antigenic structure and other properties of fixed rabies virus, concluded that in the

present state of our knowledge there would appear to be no scientific basis for replacing the Pasteur strain of fixed virus by local strains for the production of the usual type of rabies vaccine.

In speaking of anti-rabies serum it is said that at the present time, in view of the experimental findings, serum preceding a course of vaccine offers the best promise of saving most of those cases of human rabies in which a short incubation time does not allow a sufficiently long period for the development of active immunity. A field trial is accordingly laid down in detail, to be carried out in series of wolf bites in Iran, where a mortality over 30 per cent. has hitherto been observed in spite of orthodox treatment.

It is recommended that wounds be treated locally with soap or detergents and when more information on the value of serum has been obtained consideration should also be given to local serum infiltration.

A simplified table giving indications for vaccine treatment has been included in the report. In the case of repeated exposures it is recommended not to revaccinate if this situation occurs in the first three months unless the additional exposure is particularly severe. Two reinforcing doses are recommended when such an interval is between 3 and 6 months and a full course if the re-exposure occurs at any time thereafter.

If allergic symptoms occur during a course of vaccination it is suggested that a trial be made of vaccine prepared from a different animal species.

For control of rabies in animals, the Committee recognizes among other measures of proven value the distinct value of periodic compulsory, prophylactic vaccination of dogs and recommends its use in areas in which the disease is enzootic. To demonstrate this a field demonstration under conditions of natural exposure will be held in the State of Israel, in which the avianized vaccine will be used for the campaign.

If a biting animal shows no sign of illness for a period of *ten* days its bite can be regarded as non-infective. Exposed livestock can be slaughtered for meat within one week of the bite or after six months.

No definite recommendation was passed with regard to holding another international rabies conference. This point will be considered again at the Committee's next session.

On the following points detailed technical information can be found in the appendices to the report.

Appendix 3–1. Notes on method of preparation of ultraviolet irradiated vaccine (" U.V." Vaccine).

Appendix 3–2. Technique of preparation of avianized rabies vaccine.

Appendix 4–1. Potency mouse test (Habel) (Fixed Virus).

Appendix 4–2. Modification of potency mouse test (Fixed Virus).

Appendix 4–3. Standard challenge virus for potency mouse tests.

Appendix 4–4. Potency guineapig test (Koprowski) (Street Virus).

Appendix 6–1. Preparation of hyperimmune antirabies serum.

Appendix 8–1. Suggested technique of biological test for confirmatory diagnosis of rabies.

Appendix 16–1. Preparation of rabies vaccine with removal of paralysis-producing factor.

Appendix 16–2. Guineapig test for paralysis-producing factor.

C. R. Klimt

Fischl, F. M. & Sulman, F. G. **Guide to the Preventive Treatment of Rabies.** *Acta Med. Orientalia.* 1950, July, v. 9, No. 7, 189–92.

The authors have tabulated indications for anti-rabies treatment in which they carefully weigh the risk of contracting rabies as against that of post-vaccination paralysis. A simplified form of this table has been included in the Report on the first session of the WHO Expert Committee on Rabies [above]. One important difference between the two tables is that the WHO Expert Committee considered three days of quarantine during which the animal shows no symptoms as sufficient indication to stop injections, while the Israeli authors recommend 10 days after the bite, or as an alternative 7 days after the start of injections. *C. R. Klimt*

Yaoi, H., Nakagami, S., Nakano, M. & Kondo, A. **Studies on the Rabies Vaccine. 1st Report : Inactivation of the Fixed Rabies Virus with Merzonin and Heat.** *Japanese J. Exper. Med.* 1949, Dec. 30, v. 20, No. 3, 393–9.

Unsatisfied with the antigenicity of, or because of presence of live virus in, the Pasteur and Semple as well as in the formalinized vaccines, the authors have attempted to find a better chemical for inactivation.

Merzonin (*i.e.*, merthiolate) was employed for that purpose in concentrations of 1, 0·1 and 0·2 per mille together with heating up to 37°C. for various lengths of time.

The authors claim to have developed a completely inactivated vaccine of good antigenicity, which is best when the merthiolate concentration is highest.

[There are a good number of objections against the execution and evaluation of the experiments. Firstly, it has not been shown what happens to rabies virus in salt solution instead of merthiolate if it is heated to 37°C. for 3 to 5 days. It is then most likely inactive. Merthiolate, which is added in similar concentrations as preservative to virus vaccines, acts as an enzyme inhibitor which has a protective effect on the antigenicity of killed virus vaccines. If LD_{50} protection titres are calculated from the tabulated results—although the Habel test has been modified so as to contain double the vaccine dose, and challenge deferred to the 16th day instead of the 14th—one finds that with the exception of one vaccine which just meets the minimum requirements of the U.S. Public Health Service, all others would be unsatisfactory. The very fact that the highest inactivating dose of the chemical should retain antigenicity best is contrary to all experience with other virus-inactivating chemicals.] *C. R. Klimt*

Dogra, J. R. **Studies on Antirabic Vaccines. V. Keeping Qualities of Semple's Vaccine.** *Indian J. Med. Sci.* 1950, Aug., v. 4, No. 8, 323–7. **VI. A Carbolised Antirabic Vaccine. (Modification of Semple's Method.)** *Ibid.* 328–33. [11 refs.] **VII. Antigenic Potency of Coonoor Culture Vaccine.** *Ibid.* 334–6.

V. Five per cent. Semple vaccine was tested at intervals of two months for its keeping qualities at icebox (5–8°C.) as well as at room temperature. At icebox temperature adequate potency was retained for up to eight months, while at room temperature potency was lost between the 2nd and the 4th month of storage. Up to two months the phenomenon of maturation was encountered, that is to say the vaccine was at its best only two months after preparation.

VI. Semple's method was modified so as to require no heating to 37°C., which has been found to have an adverse influence on the potency of the product. According to this method, 24 hours at room temperature (26°C.) with 1 per cent. carbolic acid to act on 10 per cent. brain emulsion and subsequent two-fold dilution and storage at icebox (5–8°C.) temperature for 2 weeks was sufficient to obtain an inactivated but highly potent vaccine.

VII. Coonoor culture vaccine as developed by VEERARAGHAVAN and supplied by himself was submitted to the Haffkine Institute's variation of Habel's potency mouse test for rabies vaccines. Two batches of culture vaccine were tested in conjunction with routine tests on human or veterinary vaccines and were found to be of no, or of very low, antigenic value in each instance.

C. R. Klimt

D'IGNAZIO, C. & ROSA, B. La rabbia umana in Etiopia. [**Rabies in Man in Ethiopia.**] *Acta Med. Italica.* 1950, July, v. 5, No. 7, 246–9.

The authors quote extensively from records in all parts of Africa, East, West, North and South, and state that it is generally reported that in Africa rabies is associated with an attenuated virus. In Addis Ababa a Pathological Institute was inaugurated in 1937 and even in its first year cases of canine rabies were recorded ; 6,000 dogs were destroyed, killed by meat poisoned with strychnine. Dogs, however, are not the only animals to be considered ; there are may wild carnivores in Ethiopia, such as lions, hyaenas, jackals, mongoose, rats and others which may harbour the virus.

The authors give details of five cases under their own observation. The incubation period was not long, 30–40 days, the course acute and fairly rapidly fatal and, in fact, differed in no important particular from the course of those seen in Europe. It is true that at times severe and mild cases would appear to occur in alternating periods and it may be that, like some other infective diseases, rabies too may exhibit such waves of virulence. *H. Harold Scott*

TIERKEL, E. S., GRAVES, L. M., TUGGLE, H. G. & WADLEY, S. L. **Effective Control of an Outbreak of Rabies in Memphis and Shelby County, Tennessee.** *Amer. J. Pub. Health.* 1950, Sept., v. 40, No. 9, 1084–8, 3 figs.

This paper describes a successful fight against a rabies enzootic among dogs, the principal feature being a mass vaccination campaign which was aided by all possible means of publicity (radio announcements, newspaper articles, placarding, distribution of leaflets by public health nurses, announcements during church services, film strips, sound trucks etc.). At this time positive animal cases were being reported at the rate of more than one per day.

In one week, 23,000 dogs were vaccinated, which together with an estimated 10,000 which had been vaccinated in the previous 3 months by practising veterinarians, brought the total to 80 per cent. of the entire dog population. As a result, the last case of dog rabies was diagnosed three months after the end of the campaign and for nearly eight months the county remained free from the disease, until one rabid dog was picked up at the city limits.

Standard market phenolized veterinary rabies vaccine was used in this campaign. [No mention of any rabies in wild life appears in the article, nor of where the disease came from after it had completely disappeared among dogs for nearly eight months.] *C. R. Klimt*

PLAGUE

MATUMOTO, M. **Studies on *Pasteurella pestis*. II. On the Relationship between the Fermentation Reaction of Glycerine by the Strains of *Pasteurella pestis* and their Geographical Distribution.** *Japanese J. Exper. Med.* 1949, Dec. 30, v. 20, No. 3, 285–94. [19 refs.]

A study of the 69 strains of *Pasteurella pestis* referred to in the author's previous report [see this *Bulletin*, 1950, v. 47, 235] gave results " agreeable to " the finding of KURAUTI in 1937 that there is a close relationship between the glycerin fermentation reaction of the bacillus and the geographical distribution of plague. Kurauti found that all the strains originating from the " 3rd permanent endemic focus " (South-East Russia, Central Asia, Mongolia and Transbaikalia) were glycerin-positive, and all strains originating from the " 1st permanent endemic focus " (the Eastern Himalayas) were glycerin-negative. [See also this *Bulletin*, 1949, v. 46, 1143.] The author suggests that the reaction may give a clue to the region in which a given epidemic has originated.

John W. D. Megaw

SCHULZ, K. H. **Control of Plague in Taranto, Italy, 1945/1946. An Account of a Successful Programme of Rodent Extermination.** *Bull. World Health Organization.* Geneva. 1950, v. 2, No. 4, 675–85.

The author describes the methods employed in the successful control of a small epidemic of plague in Taranto in 1945.

The first case occurred on 6 September and the last on 29 November. All the patients were known to have had clearly demonstrable contact with the primary focus of infection. There were 29 cases, of which 15 were fatal.

The control operations were carried out by the British Army till 20 October ; they consisted of the burning of a cargo of rags suspected of being the original source of infection ; the cleaning and spraying with DDT of the shed in which the rags had been stored ; the poisoning of rats, in the course of which 25,000 poison baits were eaten by the rats, the laying down of a " DDT zone " in which all houses to a depth of two to three blocks round the source of infection in the dock area were " carpeted with a layer of DDT in solution and in powder ", which was constantly renewed ; the isolation of patients ; the inoculation of contacts, whose houses were thoroughly sprayed with DDT and cleared of rodents ; and provision for dusting with DDT all residents in the DDT zone who were willing to accept the broadcasted invitation to avail themselves of this procedure.

From 23 October, when the military commitments had decreased, the Division of Health of the United Nations Relief and Rehabilitation Administration collaborated with the Italian civil authorities in carrying on the control operations and on 19 November a systematic campaign of rat poisoning was started, in the first stage of which 10,063 points were baited, with the result that 1,856 dead rats were found up to 24 November.

As the last case occurred on 29 November and the extension of rat poisoning to the rest of the town did not start till 10 December it can be assumed that the measures already mentioned had controlled the infection. Although the distribution of the cases in time and place is not stated it seems likely that the initial prompt action taken by the British Army Medical Staff, under the direction of Col. T. B. H. Tabuteau and Major R. M. Giles, was the crucial factor in preventing the spread of the disease. Details are given of the extension of rat destruction to the whole of Taranto in the course of which a further number of 5,075 dead rats were found up to the end of February, 1946.

In the last stage of operations which concluded on 16 March, poison baits were laid down at more than 7,000 points and only 269 dead rats were found. None of the 308 rats examined during the operations was found infected.

John W. D. Megaw

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

LIEBMANN, H. Beitrag zur Kenntnis der Kernteilung bei vegetativen Stadien von *Entamoeba coli* Lösch. [**Nuclear Division in the Vegetative Stage of** *Entamoeba coli*.] *Arch. f. Protistenk.* 1944, v. 97, No. 1, 1–6, 13 figs. on 1 pl. [17 refs.]

It is known that the nucleus of amoebae of the genus *Entamoeba* divides by mitosis, but this process has not been described in detail for *E. coli*. The account given in this paper is based on the study of the trophic amoebae from faecal preparations fixed with Schaudinn's fluid and stained with Heidenhain's haematoxylin. Nuclear division of *E. coli* is a typical mitosis taking place within the nuclear membrane. The author has shown for the first time that mitosis in this species is preceded by division of the centriole, and that a typical equatorial plate is formed during the metaphase, while the number of chromosomes is four. During nuclear division the amoebae ingest little or no food, judging from the absence or scarcity of food-vacuoles in the cytoplasm.

C. A. Hoare

EVERARD, A. **Latent Amoebic Dysentery.** [Memoranda.] *Brit. Med. J.* 1950, Oct. 7, 818–19.

The author writes of a man of 60 who had spent much of his early life abroad in the Army. His only significant history was of three hospital admissions for diarrhoea in Mesopotamia between 1916 and 1918. He returned finally to England in 1919 and was in good health until 1944, when he developed intermittent diarrhoea after a family bereavement. He lost weight, and his condition deteriorated and a diagnosis of ulcerative colitis was made. The condition responded temporarily to sulphaguanidine, but relapses occurred and increased in frequency and the patient was obliged to retire from work in the middle of 1945.

He was seen by the author in Newton Abbot in 1947, when he had whooping cough. The diarrhoea was still present and the patient passed 6 to 10 stools daily, containing blood and mucus. His weight had fallen to 8 stone (50·1 kgm.), his haemoglobin was 45 per cent. and red cells 4 million per cmm. He was treated for ulcerative colitis and anaemia.

Two months later the whooping cough had cleared, but the diarrhoea persisted and amoebic dysentery suggested itself. Sigmoidoscopy (8 in.–20 cm.) revealed several haemorrhagic crateriform ulcers. Entamoebae "containing ingested erythrocytes and exhibiting pseudopodial motility characteristic of *Entamoeba histolytica*" were found in two separate specimens of stool. Radiographic examination showed a raised right diaphragm and partial obscuring of the costophrenic angle. The leucocytes amounted to 8,300 per cmm., with 86 per cent. neutrophiles.

A very comprehensive anti-amoebic treatment was given (and is described). Bowel action became normal in 5 days and within a month the patient had gained 28 lb. (12·7 kgm.) in weight. Sigmoidoscopy showed an almost normal mucosa, the stools were negative for *E. histolytica* cysts and the blood showed

75 per cent. haemoglobin and 5·3 million red cells per cmm. Within six months the patient weighed nearly 12 st. (76·2 kgm.) and was able to do light work. Sigmoidoscopy a year later showed no ulcers or amoebic cysts.

The author points out that while amoebic abscess of the liver may occur up to 30 years after primary infection, such a long interval is not common in intestinal amoebiasis. It is estimated that the interval in this case was 28 years. It seems very improbable to the author that this case was indigenous.

The author suggests that there may be other cases diagnosed as ulcerative colitis in which there is an underlying but unrecognized infection by *E. histolytica*.

[The possibility of indigenous infection cannot of course be entirely ruled out, however improbable. For a discussion of the question of amoebiasis in Britain, see this *Bulletin*, 1950, v. 47, 1083.] *H. J. O'D. Burke-Gaffney*

HARTZ, P. H. **Perforation of an Amoebic Hepatic Abscess into the Pericardial Cavity.** *Documenta Neerlandica et Indonesica de Morbis Tropicis.* Amsterdam. 1950, Sept., v. 2, No. 3, 231–4.

"A case of sudden perforation of an amoebic abscess of the left hepatic lobe into the pericardial cavity. The changes of the electrocardiogram after the perforation were characteristic for pericarditis, but this diagnosis was rejected because of the clinical picture which was dominated by embolic processes. The amoebic abscesses observed in the post-mortem material of Curaçao are briefly discussed."

SIGUIER, F., PIETTE, M. & CROSNIER, J. Etude comparative de l'émétine et de la conessine dans le traitement de l'amibiase. [**Comparative Study of Emetine and Conessine in the Treatment of Amoebiasis.**] *Maroc Méd.* 1949, June, v. 28, No. 289, 300–309.

The divergent opinions expressed on the value of Kurchi treatment may be accounted for by the differing chemical constitution of samples of *Holarrhena*, not only in respect of species but also of place of origin. The commercial extraction of pure conessine has resolved this problem. Comparisons of the effect of conessine and of emetine added to cultures *in vitro* of dysentery amoebae show that a concentration of conessine four times that of emetine is necessary to produce the same inhibitory action ; but the therapeutic dosage of conessine is five times that of emetine. Conessine like emetine is slowly excreted.

The authors, in Paris, have treated 37 patients with conessine. These patients can be divided into two types, those (23) suffering from acute dysentery and those (14) with chronic infections, in some cases the cause of symptoms. Of the 23 in the first group 2 were suffering from acute attacks of amoebic dysentery for the first time, 3 from acute relapses some time after repatriation, and 18 from acute relapses shortly after return from overseas. Conessine treatment afforded rapid relief to the first two groups of acute cases in a manner comparable to that obtained with emetine. The 18 patients with acute relapses who had recently returned from overseas could be further subdivided into three categories : (1) Eight patients with a history of repeated relapses which had yielded to emetine treatment ; 6 of these responded rapidly to conessine treatment, the other 2 proved refractory to it, though they responded to emetine : (2) Seven patients with a history of repeated relapses which had

proved resistant to emetine treatment ; though 4 of these responded satisfactorily to conessine treatment, 3 did not do so : (3) Three patients suffering from severe intractable amoebic dysentery which was clinically resistant to emetine ; on these cases conessine had equally little effect. Thus 14 of 23 acute cases of amoebic dysentery of various types responded to conessine treatment while 9 (39 per cent.) did not do so ; and the authors are of the opinion on their observation that it is incorrect to claim that conessine is effective in cases of acute amoebiasis refractory to emetine.

Of the 14 patients harbouring chronic *Entamoeba histolytica* infections, 7 suffered symptoms while the other 7 were symptomless. Of those in the first category, 2 benefited clinically from conessine treatment, 3 were slightly better after it, and 2 derived no benefit from it. Of those in the second category, 4 were cleared of their infections, as judged by 6 stool examinations ; the other 3 were not. Eight of 14 cases of chronic *E. histolytica* infection therefore failed to respond to conessine treatment ; this is a higher proportion of failures than among the acute cases treated by the authors. Six cases of amoebic liver infection were treated with conessine with a mediocre or negligible result ; when emetine was given to these patients it rapidly produced the desired effect. The authors therefore disagree with the statement of LAVIER, CROSNIER and MERLE [this *Bulletin*, 1949, v. 46, 469] that conessine is the equal of emetine in the treatment of hepatic amoebiasis ; they consider emetine to be superior to conessine in hepatic amoebiasis.

Conessine treatment does not cause gross toxicity ; in therapeutic dosage it is less toxic than is emetine, though it does cause some inconvenient side-effects.

The authors conclude that :—

(1) Conessine is inferior to emetine in the treatment of hepatic amoebiasis, and presumably, by analogy, also of pulmonary amoebiasis.

(2) Conessine is inferior to emetine in the treatment of true chronic amoebiasis and of symptomless infections with *E. histolytica*.

(3) In spite of these defects, conessine is useful in intestinal amoebiasis as its action is equal to that of emetine in the control of acute and of subacute attacks of amoebic dysentery ; conessine has the additional advantage that it can be given by the mouth as an ambulatory treatment.

They add the warning that while conessine merits a place in the therapeutic armament against intestinal amoebiasis, its adoption does not warrant the premature abandonment of that "admirable drug" emetine, even with the latter's defects. *A. R. D. Adams*

RUIZ SANCHEZ, R., RIEBELING, Rebeca & ARREOLA, C. El tratamiento de la disenteria amibiana con terramycin. Nota preliminar. [**Terramycin in the Treatment of Amoebic Dysentery.**] *Medicina*. Mexico. 1950, Sept. 10, v. 30, No. 611, 365–9.

The authors in their introductory remarks state that terramycin has been shown to be active in acute brucellosis, but the two references given are to papers "in the press". It is also stated that in the course of previous observations it had been noted that terramycin acted also on the intestinal parasites of man, *Entamoeba coli*, *E. histolytica*, *Giardia intestinalis* and *Trichuris trichiura*.

In consequence the authors have treated 20 persons passing cysts of *E. histolytica* and 8 patients with amoebic dysentery. The former group were

given 100 mgrm. per kilo body-weight daily for 4 days in divided doses in the case of 2 patients ; 50 mgrm./kgrm. were given daily to 12 patients, 30 mgrm./kgrm. to 2 and 25 mgrm./kgrm. to four. In 15 of the cases cysts were not seen after the first day's treatment ; in 4 after 2 days ; in one only did they persist.

Details are given of the 8 with actual dysentery ; these are very similar, so one will suffice. A man of 36 years had had symptoms for 45 days ; they had started fairly suddenly with tenesmus and colic and 8–12 motions daily with blood and mucus, a little fever, general debility and anorexia ; there was moderate microcytic anaemia. Rectoscopy showed numerous typical ulcers and the mucus from them contained abundant *E. histolytica*. He had had repeated attacks such as this during his stay in the tropics. He was given terramycin, 40 mgrm. per kilo daily for 4 days. After 24 hours he had no more pain and evacuations were fewer ; in 2 days the faeces were normal in appearance except for some mucus. Repeated examinations failed to reveal any amoebae and the patient left hospital 20 days later " in excellent condition."

This is only a preliminary note and as the authors say " Fresh observations with stricter control will be needed for confirmation of the results described in this preliminary note ". *H. Harold Scott*

Hoekenga, M. T. & Gonzalo Maximo, Q. **Trial of Enteric-Coated Camoquin in Intestinal Amebiasis.** *Amer. J. Trop. Med.* 1950, Sept., v. 30, No. 5, 625–7.

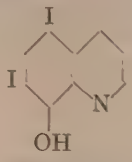
" Enteric-coated Camoquin proved ineffectual in the treatment of intestinal amebiasis in 15 individuals ; only 4 or 27 per cent were apparently cured even with total dosages as high as 11·4 Gm. The drug was equally ineffectual in treatment of the *Trichomonas hominis* that 8 of these patients harbored. Two-thirds of the patients had definite symptoms of toxicity with dizziness being the most pronounced and frequent complaint. As a result of these observations, enteric-coated Camoquin is not recommended for the treatment of intestinal amebiasis."

Ishii, Y. **On the Influences of Extracts of *Phizoma rhei* and *Semen pharbitidis* upon the Infection of *Entamoeba histolytica* in Rats.** *Kitasato Arch. Exper. Med.* 1950, July, v. 23, No. 1, 27–31.

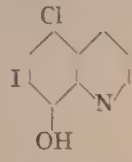
The author infected white rats intracaecally with cultures of *Entamoeba histolytica* accompanied by irritant drugs in the inoculum or given orally 3 days later, in order to note their effect on resultant infections. Control animals received no drug. The substances used were an aqueous extract of *Rhizoma rhei* dried to a dark powder and a 24-hour alcoholic extract of *Semen pharbitidis* which was oily in character, and before use, was mixed with 2 parts of glycerol. One week after inoculation the rats were killed and the degree of infection and state of the caecum was determined. No evidence was obtained that either substance caused increased susceptibility to infection : rather the reverse was found in the case of *Rhizoma rhei* extract. Some enhancing effect of the second substance as regards the formation of ulcers is claimed. The histological findings in the caecum are given. [The rate of infection appears to have been disappointingly low and the rats were apparently heavily infected with *E. muris* which tended to complicate the results. No references are given to recent English literature on this subject.] *J. D. Fulton*

Haskins, W. T., Luttermoser, G. W. & Brady, F. J. **The Physiological Disposition of Diodoquin, Vioform, and Chiniofon in the Rabbit as determined with Radioiodine.** *Amer. J. Trop. Med.* 1950, Sept., v. 30, No. 5, 599–612, 4 figs.

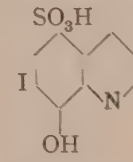
The structural formulae of the substances indicated in the title of this paper are as follows :—



Diodoquin



Vioform



Chiniofon

These three substances labelled with radioactive iodine have been used to study the distribution, absorption and excretion of iodine in rabbits after oral or intravenous administration. Previous determinations of iodine blood levels by chemical means after dosage of human patients by these substances have been recorded by David *et al.* and Knight & Miller [this *Bulletin*, 1944, v. 41, 672 ; 1949, v. 46, 940] and indicated that chiniofon was the least well absorbed. Albright *et al.* [1948, v. 45, 181] used chiniofon with radioactive iodine and reached a similar conclusion. For the preparation of these three substances with the radioactive element, iodine chloride containing I^{131} with a half-life period of 8 days was used as the iodinating agent. Rabbits of 3·5 kgm. were given the radioactive drugs by the oesophageal route once daily on 7 consecutive days in doses of 20 mgm. per kgm., and for comparative purposes potassium iodide also containing radioactive iodine was used in doses of 7·16 mgm. of this element per kgm. Chiniofon and diodoquin were given in a similar single intravenous dose. The radioactivity of blood, urine, and faeces as well as tissues was determined with the aid of a Geiger-Müller counter. Chemical determinations were made on urine of iodine organically bound—representing the parent drugs or metabolite and also on ionized iodine (inorganic form). Differences in the rate of absorption of iodine as well as in mode of excretion were noted for these substances. Sometimes elimination was greatest in faeces or in other cases in urine. Iodine from potassium iodide occurred mostly in urine. Different results followed oral or intravenous administration. After vioform the concentration of iodine in tissues was in general smaller than after the two other substances, while potassium iodide gave rise to the most generalized distribution. Blood iodine levels were raised in every case but the pattern of distribution varied, and the results with chiniofon indicated that it was present in blood in metabolized form after oral administration. It was also concluded that degradation products were present in the urine. The differences in blood iodine concentration after administration of these three substances, combined with their inactivity in amoebic hepatitis point to the fact that the values for circulating iodine have little relation to the effective treatment of intestinal amoebiasis. *J. D. Fulton*

See also p. 48, Hoenkenga, **The Incidence of Human Intestinal Parasites in Northwestern Honduras.**

Pettazzi, A. La coltura dei flagellati intestinali. Prime osservazioni. [**Cultivation of Intestinal Flagellates.**] *Acta Med. Italica*. 1950, July, v. 5, No. 7, 230–32. [20 refs.] English summary.

Those interested or engaged in the cultivation of intestinal flagellates should study the original as the account of these early observations does not lend

itself to abstract ; it is already itself too condensed. The author refers to the many media which have in the past been suggested for cultivation of amoebae and shows how modifications of these have enabled him to obtain cultures of *Trichomonas hominis, Chilomastix mesnili. Enteromonas hominis*, and *Endolimax nana* ; *Embadomonas intestinalis* was grown with more difficulty, at all events successes were fewer, only two in number and these died out in a few days. *Giardia intestinalis* would not grow in any of the media tried. These are given as " first observations " ; presumably the subject will be followed up and further report will be made. *H. Harold Scott*

RELAPSING FEVER AND OTHER SPIROCHAETOSES

Heisch, R. B. & Grainger, W. E. **On the Occurrence of** *Ornithodoros moubata* **Murray in Burrows.** *Ann. Trop. Med. & Parasit.* 1950, July, v. 44, No. 2, 153–5.

This is an account of the discovery of the ticks *Ornithodorus moubata* and *O. erraticus* in burrows in three areas in Kenya. These areas are many miles apart and are practically uninhabited. Details are summarized in a table.

The most interesting observations were made on Crescent Island (Lake Naivasha). Large burrows here were 1 to 2 feet wide at the entrance and had corridors 12 to 35 feet long ending in a chamber at least 6 feet below ground level. They were probably excavated by ant-bears, then abandoned and were later used by other animals including porcupines and occasionally wart-hogs. Most of the *O. moubata* were found in the corridors. Small burrows of the pygmy gerbil (*Dipodillus* sp.) were found to contain *O. erraticus*.

Ticks and porcupines from the large burrows were found to be negative for *Spirochaeta duttoni*, but another spirochaete was recovered from *O. erraticus* and *Dipodillus* and was shown to be infective to *O. moubata* under laboratory conditions.

It is noted that the infested burrows were many miles from known endemic centres of relapsing fever. *H. S. Leeson*

Mazzotti, L. La aureomicina en el tratamiento de la fiebre recurrente humana causada por *Spirochaeta turicatae*. [**Aureomycin in the Treatment of Relapsing Fever caused by** *S. turicatae*.] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1950, Mar., v. 11, No. 1, 53–5.

The English summary appended to the paper is as follows :—

" Aureomycin given by oral route in two patients infected with tick relapsing fever produced favourable results."

Oehme, J. Heilung einer Rattenbisskrankheit im Kindesalter durch Penicillin. [**Ratbite Fever in a Child cured by Penicillin.**] *Deut. med. Woch.* 1950, Sept. 22, v. 75, No. 38, 1258–9.

Ratbite fever is an uncommon disease. In his review of the world literature of the disease in 1932, Bruning described 70 cases in children, of which 7 were in Germany. Since then 16 additional cases have been described in children, one of which proved fatal. Treatment of this condition with penicillin has not yet been described in the German literature.

The case described was that of a child of 7 who was bitten by a rat, apparently a water rat, on the right foot. The wound healed, but 15 days later the foot became swollen and the location of the bite livid. Treatment by heat resulted in some improvement but two days later [the summary says 8 days] there was high fever which left the child weak, but with no other evidence of disease beyond the local injury. The fever recurred but there were periods of 2 to 4 days free from fever between the pyrexial attacks. During the third pyrexial period a generalized rash appeared which became exacerbated with each pyrexial attack and was accompanied by pains in the joints. The attendant physician diagnosed rheumatism with erythema nodosum. Six weeks after the injury the patient was brought to the clinic and on examination there was a bluish scar on the dorsum of the right foot with desquamation of the surrounding skin, the lymph nodes in both groins were palpable, especially on the right, there was slight secondary anaemia with increase of leucocytes, particularly eosinophiles, agglutination was positive 1 : 50 to typhoid but negative to paratyphoid and *Br. abortus*. The Wassermann and Kahn tests were positive and the tuberculin test negative. Serum from the rash examined under dark-ground illumination for spirilla was negative. Blood was injected intraperitoneally into mice and guineapigs. The child's temperature rose higher and the rash presented the appearance of exudative erythema multiforme. On the fifth day after injection spirilla were demonstrated in blood from the white mouse.

Treatment with penicillin was commenced after demonstration of the spirillum, 25,000 units being administered every three hours until a total quantity of one million units was received. This was followed 12 hours later by a crisis in the fever and fading of the rash, the systolic murmur became softer but over the pulmonary area it became rougher, the erythrocyte sedimentation rate fell to normal and cure followed. There was no relapse after the treatment. *P. A. Clearkin*

LEPROSY

STEINIGER, F. Die Lepra im Ost- und Nordseeraum. [**Leprosy in the Baltic Countries.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1950, Sept., v. 2, No. 2, 175–93, 12 figs. [11 refs.]

This is a general account of leprosy in the Baltic countries, Finland, Estonia, Latvia, Lithuania and Memelland. Cases now are not many and, as far as records can be relied upon, the disease was dying out 150 years ago, when it was again introduced by troops returning from Russia. Heredity appears to play a considerable part in the spread. One genealogical record is given in which cases occurred in each of four generations ; in another, a woman suffering from leprosy and tuberculosis had four children : one, a daughter who was leprous, a son and two other daughters tuberculous ; one of the latter had five children, 3 daughters and 2 sons, all tuberculous. Speaking generally, females seem to be more susceptible than males ; at all events there are more women than men suffering from the disease. Though declining in most of the Baltic countries the disease is still endemic in Memelland. *H. Harold Scott*

GEHR, E. Geschlecht und Lepra. [**Sex and Leprosy.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1950, Sept., v. 2, No. 2, 193–8. [28 refs.]

SIGNORINI, F. L. & TERNI, M. Ricerche culturali e sierologiche sulla lepra. [**Cultural and Serological Researches in Leprosy.**] *Boll. Istituto Sieroterap. Milanese.* 1950, Mar.–Apr., v. 29, Nos. 3/4, 70–116, 3 graphs. [Bibliography.] English summary.

This is a long article but it covers a vast ground and the effort entailed in collecting the information and putting it together is worthy of all praise. The first half will be of great interest and help to the medical historian, the second half of equal interest to the bacteriologist. The first half gives an account of the many researches into cultivation and attempts to cultivate the bacterium of leprosy. More than a hundred names are mentioned and in a table are given 86 of them, the year in which they recorded their findings, the organisms they described, the source of the material with which they started the cultivation, the media they used and other information. Another table of 25 names is given of those whose attempts at cultivation proved abortive. This is followed by remarks on the serological reactions in leprosy : complement fixation with a lepromatous antigen or with cultures of acid-fast or other bacteria, the Wassermann reaction in leprosy, flocculation reactions with syphilitic antigen, other serological reactions as formol-gel, the Vernes and the Rubino reactions. For readier comprehension all these are presented also in the form of tables.

In the second part the authors record their own researches in cultivation on various media and in the larvae of *Galleria mellonella.* The material for the cultures was taken from leprosy nodules, from nasal mucus of patients and from the blood. This material was sown either directly or after homogenization on to the media or by injection into the body cavity of the insect larvae, 1·5–3 cm. in length. Twenty-eight of them were injected with material from nodules and 9 with nasal mucus. In five of the former and one of the latter acid-fast bacteria were seen at autopsy 2 to 11 days after the inoculation, but attempts to transmit to other *Galleria* larvae or to grow them on artificial media were unsuccessful. On Dubos's medium, glycerin potato and others, always in aerobiosis, there grew an organism with the following characteristics : non-capsulated, non-sporing, non-motile, acid-fast, but becoming less so with time. Its pathogenicity was tested by subcutaneous, intravenous and peritoneal inoculation of rabbits, guineapigs, white rats and white mice without very definite results. Serological tests—precipitation, agglutination, complement fixation—were carried out with antigenic extracts of the bacteria (methyl alcohol, acetone and others). The results are again presented in tables which show very varying results, but there was distinct specificity in the complement fixation reaction when a methylic antigen was used. For further details those interested should consult the original ; the whole article is replete with points of interest. There is a full bibliography of well over 400 references.

H. Harold Scott

LIPPI, M. La colesterinemia nella lepra. [**Cholesterinaemia in Leprosy.**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1950, Apr., v. 31, No. 4, 266–73.

The English summary appended to the paper is as follows :—

" On testing the cholesterol content of the blood in 19 cases of leprosy, certain relations between this and the clinical form of the disease and the general conditions of the patient were observed : the cholesterol content appeared diminished in the tuberculous form and in patients in serious general condition. No relation was, however, found between the cholesterol content and the initial manifestations of the disease, nor with the condition of spleen and liver or with previous diseases."

See also p. 75, ELLIOTT, **A Further Report of Polypoid Leprous Lesions of the Fundus. Observations of Six Cases.**

KOSTERMANS, D. De bereiding van gejodeerde Chaulmogra-esters. [**The Preparation of Iodized Chaulmoogra Esters.**] *Med. Maandblad.* Djakarta. 1950, Aug. 1, v. 3, No. 8, 285–7.

RATH DE SOUZA, P. & DE SOUZA LIMA, M. Sôbre o mecanismo da ação terapêutica dos derivados sulfonicos na lepra lepromatosa. [**Mode of Action of Sulphone Derivatives in Lepromatous Leprosy.**] *Rev. Brasileira Leprologia.* S. Paulo. 1950, June, v. 18, No. 2, 59–68, 6 figs. English summary.

The authors present a series of photomicrographs showing as clearly as unstained reproductions can the histological features of lepromatous tissue without sulphone treatment and during the use of sulphone drugs. While not affirming that the drugs have no effect on the *Mycobacterium leprae* itself they incline to the belief that they act rather on the lepra cell and, perhaps by altering its metabolism (but this is uncertain) render it unfavourable to the bacterium, its multiplication or even its survival. Under other forms of treatment the same changes may be observed, characterized by swollen Virchow's cells, pyknotic nucleus, foamy appearance of cells, vacuoles with lipids " inversely proportional to the number of bacilli " and granularity of the bacilli. [Though the photographs are clearly reproduced a good deal of faith is needed to imagine " enormous numbers of Hansen's bacilli " in a section stained by the Ziehl-Neelsen method but reproduced merely as a black and white photograph.] *H. Harold Scott*

FERREIRA, D. L. A vitamina C na leprose. [**Vitamin C in Leprosy.**] *Publicações Médicas.* São Paulo. 1950, May, v. 20, No. 176, 25–8.

The author claims that " vitamin C is a valuable aid in the treatment of leprosy " and gives brief notes, of a couple of lines or so each, of 25 patients. He gave the vitamin intravenously in doses of 5 cc. or 0·5 gm. daily. The number of injections varied : seven had 10 injections, two had 12, nine had 15, four had 20, one had 25 and two had 30. None showed any signs of intolerance, though they were carefully watched, weighed and examined frequently during six months ; but there was no change in the bacterial condition. [It is not easy to see what advantage was due to the vitamin C, for the patients received also calcium gluconate and hypertonic glucose intravenously at the same time ; some had autohaemotherapy in increasing doses and " whenever it was possible we pursued treatment with chaulmoogra injections and infiltrations ".] *H. Harold Scott*

BOLGERT, M., MONTEL, L. R. & MOLLINEDO, R. Essais de traitement de la lèpre par le P.A.S. Note préliminaire. [**Attempts to treat Leprosy with Paraminosalicylic Acid (PAS).**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 7/8, 390–91.

The authors refer briefly to three cases of leprosy : (1) a tuberculoid lesion of the cheek which partially regressed in a fortnight after 1 to 3 gm. of PAS daily, (2) a perforating ulcer of the foot in a stabilized neurotrophic case of leprosy which improved rapidly after dressings of PAS. It is, however, added in this case that the patient had also had a perifemoral sympathectomy. (3) A neurotrophic case with multiple amyotrophic manifestations in which subjective improvement occurred after 10 gm. of PAS daily for two months. Local treatment with 30 per cent. PAS solution in this case also produced favourable

effects on a surgical wound associated with an amputation (Lisfranc) for leprotic disease of a metatarsal.

The authors propose to undertake a systematic study of PAS in the treatment of leprosy and to publish their results. *H. J. O'D. Burke-Gaffney*

DE SOUZA-ARAUJO, H. C. Tratamento ecléctico da lepra. 20 anos de experiência. ["**Eclectic" Treatment of Leprosy.**] *Mem. Inst. Oswaldo Cruz.* 1949, Mar.–June, v. 47, Nos. 1/2, 129–210, 20 graphs & 42 figs. English summary.

There is no good English word equivalent to "ecléctico". "Selective" or "method of choice" perhaps come near to it, but the author uses it for "a selected combination of methods". This article is intensely practical and those engaged in the actual treatment of leprosy patients would do well to study it very carefully. It is not possible in an abstract to do it full justice, for each of the 20 cases detailed reveals many points for consideration. The outlines of the author's scheme may, however, be indicated; we use, as far as possible, his own words: Large and isolated lepromata are extirpated surgically and the nasal and aural lesions by plastic operations followed by galvano-cautery; perforating ulcers are operated upon, as by sympathectomy, and diathermy is afterwards applied; neural abscess and calcification are treated by surgical relief of pressure; electricity or infra-red rays ease the neuritis, or, if pain is severe, cocaine, adrenalin, ephedrine sulphate and peri- or intra-neural injection of warmed ethyl ester of chaulmoogra; active lesions of skin and mucous membranes are destroyed by diathermy coagulation or galvano-cautery and painted with solutions of trichloracetic acid, 1 : 1 to 1 : 4 in distilled water, every fortnight. The nasal lesions of advanced nodular leprosy do well with electricity followed by phenol 10 per cent. in alcohol or by tampons of mentholated chaulmoogra oil or its ester, or Antileprin Rivolta may be given. The treatment is listed under the headings of "Antilebbrine" injections, 5 cc. at a time, injections of ester-iodide or creosoted ester, or the purified oil, injection of Calmestrol Bayer, of Alogan", and iodo-moogrin, chaulmoogra *per os*; menthol-thymol ester nasally and the cautery and adjuvants mentioned above, but the scheme generally adopted by the author was electricity and minor surgical operations, galvano-cautery weekly for active lesions followed by application of trichloracetic acid 30 per cent. locally, and chaulmoogra derivatives as the ester, 2 per cent. in menthol or thymol as nasal tampons, injection into glands and nerve abscesses, subcutaneous infiltrations of 5 cc. each, as recommended by Muir, and chaulmoogra *per os*. A chaulmoogra preparation, 3 per cent. in strength, known as Subintrol, used for infiltration into lepromata, is reported upon very favourably; the tumours, it is said, "were completely destroyed and never relapsed". Muir's suggestion of combining diasone with galvano-cautery has recently been followed and the results are said to be satisfactory.

The minute details of the 20 cases recorded include, prior to beginning treatment, many laboratory examinations, namely search for the organism in the nasal mucus, the skin and glands; the reactions of Wassermann, Stern, Kahn, Rubino, Witebsky and Gaté-Papacostas, and the blood sedimentation index each month; also a full clinical examination, the details of treatment and the results of subsequent clinical overhauls. Fourteen received treatment for 17 months, three for 9 months, two for 12 months and one for 11 months; four others received treatment for shorter periods. The bacilli became more

numerous for a time after the treatment started, but 14 of the 20 finally became bacterially negative. Photographs show the wonderful improvement in the lesions ; the facial improvement is very marked. *H. Harold Scott*

Brotto, W. Tratamento das neuralgias cubitais e ciáticas em hansenianos pelo sulfato de amônio associado à procaina. [**Treatment of Ulnar and Sciatic Neuralgia in Leprosy by Procaine and Sulphate of Ammonium.**] *Rev. Brasileira Leprologia.* S. Paulo. 1950, June, v. 18, No. 2, 84–93, 2 figs.

Some six years or more ago a preparation of *Serracenia purpurea* was used with success in cases of segmental neuralgia ; the active principle of this was found to be ammonium sulphate, the ammonium ion acting selectively on the nerve-fibres. It is ineffectual in pain in muscles, tendons or ligaments. In 1945 Melaragno and Tenuto used ammonium sulphate and procaine in 7 cases of sciatica, 2 of occipital neuralgia and one of intercostal neuralgia with complete success.

The author himself uses a 0·75 per cent. solution of ammonium sulphate in water and 2 per cent. procaine, in ampoules of 6 and 4 ml. respectively, mixed immediately before injection and these injections are repeated every 5 days. If there is no relief after four or five injections the treatment is suspended, but if there is remission of the pain a series of 10 injections is given.

Details are presented of six leprosy patients with ulnar neuralgia and six with sciatica, treated in this way. For the former the injections are made in the paravertebral region of the VIIth and VIIIth cervical and Ist dorsal roots. Details are given and also a diagram to show how this site is reached by the puncture needle. The results in the six cases are thus reported : No. 1 ; relief after the first injection, but the pain returned ; after the second injection there was exacerbation for some hours, but after the 4th injection there was complete relief. No. 2 ; pain disappeared after the 4th injection. No. 3 ; no pain after the third injection. No. 4 ; had only one injection and did not come again, but when seen later he said that he still had pain, but it was not severe enough to prevent him working or interfere with sleep. No. 5 ; after the 4th injection had an attack of fever and generalized pain, so treatment was suspended and started again after a month. The pain disappeared after the 8th injection. No. 6 ; pain remitted after the 3rd injection and he continued better for 6 months. The pain then returned and the patient, unable to consult the author, saw a surgeon who operated and gave complete relief.

In the second series, the sciatic cases, in all but one the infiltration was made into the trunk of the nerve in the gluteal region and this is recommended except when the pain is diffuse over muscles, bones and joints ; then the paravertebral infiltration is to be preferred into the lumbar roots. The details of each of these are also given. No. 1 ; worse after the first injection ; then progressive improvement and there was no more pain after the course was completed. No. 2 ; better after the 3rd injection and no pain after the 9th. No. 3 ; pain disappeared after the 8th injection. No. 4 ; better after the 4th and total remission by the end of the series. No. 5 ; after the first injection had general pain and fever which persisted more or less for 6 months. The treatment was then started again and the pain was eased after the 3rd injection and ceased by the end of the course. She remained well for 2 months and then had a fresh attack of the general pain with fever. No. 6 ; was injected paravertebrally into the lumbar roots and also along the nerve trunk. The pain was relieved altogether for a few hours, but then returned and persisted even after the full course of 10 injections and she continued to use analgesics in high doses.

The author ends by reiterating the warning that this method of treatment is of value only in "obstinate segmental neuralgias". *H. Harold Scott*

JAGADISAN, T. N. **All about Leprosy.** pp. vii+99. 1948. Bombay : V. Kulkarni, Hind Kitabs Ltd., 261–263 Hornby Road. [6*s*.]

HELMINTHIASIS

HOEKENGA, M. T. **The Incidence of Human Intestinal Parasites in Northwestern Honduras.** *Amer. J. Trop. Med.* 1950, Sept., v. 30, No. 5, 757–9.

"Results have been presented of a survey of single stool examinations of 5,000 persons in northwestern Honduras, and a comparison made with previous studies in Honduras. Three-fourths of all persons examined were revealed to have one or more species of intestinal parasites on such single examinations. The incidence of round-worm infection and of amebiasis is high."

BERKIN, T. & BERKE, Z. Bilharzia hastaligi hakkinda. [**A Study on Bilharziasis.**] *Türk Ijiyen ve Tecrübî Biyoloji Dergisi.* Ankara. 1949, v. 10, No. 1, 145–65, 1 map & 1 fig. [10 refs.] English summary 166.

Much of this paper is concerned with general observations on schistosomiasis and in a discussion of the incidence of the disease in parts of Syria and Iraq and its control in these countries and in Egypt. The disease is not endemic in Turkey and the few cases seen during the last 30 years have been imported from Iraq and Syria.

A survey made in parts of Turkey during 1950 revealed no cases, even near the borders of Iraq and Syria. Snails taken from collections of water in these regions were not found to be those species which carry schistosomiasis, except for some from Suruç (which is shown on an accompanying map) and which "were like *bulinus*". They were "considered as uninfected for the region was free of infection", but more extensive parasitological studies are to be made.

H. J. O'D. Burke-Gaffney

GILLET, J. Contribution à l'étude de la bilharziose urinaire au Congo Belge (2ème partie). [**Study of Urinary Schistosomiasis in the Belgian Congo.**] *Ann. Soc. Belge de Méd. Trop.* 1950, June 30, v. 30, No. 2, 195–204. [15 refs.]

In the island of Mateba, Belgian Congo, with a population of 309, urinary schistosomiasis is endemic and bovine schistosomiasis is also present. Morphological studies of adult parasites and eggs led to their identification as *S. haematobium* and *S. bovis* respectively. The snail intermediary of the human disease is *Physopsis africana*, which is believed also to be the transmitter of the bovine parasite on the island. The possibilities of prevention are discussed.

J. J. C. Buckley

NEWSOME, J. & HALAWANI, A. **The Treatment of Urinary Bilharzia in Egypt by Miracil D.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1950, July, v. 44, No. 1, 67–76, 1 fig.

Earlier [this *Bulletin*, 1949, v. 46, 753] Miracil D was found to be unsatisfactory in the cure of Egyptian urinary bilharzial disease ; but Rhodesian workers

[*ibid.* 848] obtained a good cure rate in their milder-type African cases. The poorer results obtained in Egyptian cases may be due to their much heavier worm load, to constant re-infections, or to pre-infections maturing after treatment. Egyptian patients suffered more from the side-effects of Miracil treatment than did the African, so it was considered impracticable to give an increased dosage to the former. Attempts have now been made so to give Miracil D as to diminish or neutralize side-effects, to maintain an adequate blood level of the drug, and to avoid the complications of re-infection or of a late-maturing pre-infection.

Seventeen strictly-confined prisoners and 17 other men working in a desert region, all of them suffering from active *Schistosoma haematobium* infections and none of them having been exposed to infection for some months, were treated orally with Miracil D (Burroughs, Wellcome & Co.), or Miracil A (of German origin), in uncoated tablets or in cachets. The course of treatment in the first group was repeated monthly for 3 months ; this was followed by an observation period of another 3 months. Pre-infections thus could mature and be subjected to at least one course of treatment after maturation. The second group of patients received only a single course ; but those of them found still to be infected after 2 months were given a second course. A course of treatment consisted of a cachet containing 1 gm. of the drug given each morning and evening for 3 days. Eight patients were given Miracil A and the remainder Miracil D.

" Cure " was the complete absence of living eggs from the urine on repeated examination by a concentration technique. Twenty-six patients were treated with Miracil D ; 10 of 13 heavily infected were cured by two or three courses of treatment ; 12 of 13 lightly infected were cured by one or two courses of Miracil D. Eight patients were treated with Miracil A ; 4 heavily infected were cured by three courses of this drug ; only 1 of 4 lightly infected was cured by two courses of it.

Miracil A caused marked abdominal colic, nausea and light-headedness on the second day of treatment ; these persisted during the third and last day of the course. Miracil D also produced side-effects in a high percentage of cases. Enteric coating of the tablets reduced the incidence and severity of the side-effects, but militated against the proper absorption of the drug when there was intestinal hurry. The citrate and mandelate salts of Miracil D were found to be less irritant than the more usually employed hydrochloride.

A. R. D. Adams

Erfan, M. & Talaat, S. **Trivalent Sodium Antimony Gluconate in the Treatment of Schistosomiasis.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1950, July, v. 44, No. 1, 123–6.

Trivalent sodium antimony gluconate in 6 per cent. solution was given intravenously in doses of 3 cc. daily for 6 days to adults weighing 60 kgm., and to children in doses proportional to their weight. Thirty patients suffering from " urinary " schistosomiasis were so treated ; 1 to 2½ months later 8 of these were still passing living ova, 5 were passing dead ova, and the other 17 were passing no ova in the urine. Six patients were similarly treated daily for 12 days ; between 1 and 3½ months later none was passing living ova, 3 were passing dead ova, and 3 were passing no ova in the urine. Thirty-three of the 36 patients suffered no side-effects from the treatment ; 2 vomited after the 4th and the 5th injections respectively ; one developed urticaria after the 3rd injection, but this lasted only 24 hours.

Trivalent sodium antimony gluconate merits further study as a cure for bilharziasis ; it has the advantage of a lower toxicity than that of the tartar emetic compounds.

A. R. D. Adams

MALDONADO, J. F., ACOSTA MATIENZO, Josefina & VÉLEZ HERRERA, F. **Biological Studies on the Miracidium of *Schistosoma mansoni*. Part 3. The Role of Light and Temperature in Hatching.** *Puerto Rico J. Pub. Health & Trop. Med.* 1950, June, v. 25, No. 4, 359–66. [Spanish version 367–76.]

" 1. *S. mansoni* eggs obtained from the livers of experimentally infected white mice and from human feces were isolated in groups of 10 or 15 and exposed to each of the following conditions : (a) bright, artificial light at lower than room temperature ; (b) room light and temperature ; (c) no light at room temperature ; and (d) increased temperature (37°C.) without light.

" 2. Eighty-three percent of the mouse strain and 49 percent of the human strain of eggs hatched during the first hour of exposure to artificial light ; 31 percent and 6 percent, respectively, during the first hour of exposure to room light. Under the other two conditions, the number of larvae that emerged during the same period of time was considerably smaller, especially in the case of eggs of human origin.

" 3. Prolonged exposure to room light resulted in the liberation of the same proportion of larvae as obtained with exposure to artificial light, but at a noticeably slower rate. Under strong illumination, the majority of the eggs of mouse and human origins hatched within one and two hours, respectively ; under room light, the majority hatched within two and 24 hours, respectively.

" 4. The statistical analysis of the data proves the observed differences to be highly significant.

" 5. Light may not be essential to hatching ; 39 percent of a number of eggs of human origin were able to hatch when kept in darkness for a prolonged period of time (over a week), but at a very slow rate.

" 6. As evidenced by the experiments with artificial light that were conducted at lower than room temperature, and by the poor hatching obtained in the incubator at 37°C., temperature is not a stimulating factor in irradiation.

" 7. Eggs obtained from mouse livers always hatched at a more rapid rate than those from human feces, but the stimulating effect of light was pronounced in both." [See also this *Bulletin*, 1950, v. 47, 553.]

MUSTAFA, D. **Some Aspects of *Schistosoma mansoni* Infection.** *Brit. Med. J.* 1950, Sept. 16, 658.

Three patients with *Schistosoma mansoni* infection in Khartoum Civil Hospital died. The first, a man of 35 years, had acute dysenteric symptoms with *S. mansoni* ova in the stools. At autopsy the whole of the length of the *small* intestine was seen to be studded externally with small bilharzial tubercles ; there were only a few on the large bowel, which nevertheless contained many ulcers and polypoid outgrowths on the mucosa. Great numbers of ova were found throughout the gut and in the mesenteric and retroperitoneal glands.

The second patient, a man of 30 years, suffered similarly. At autopsy the colonic mucosa was found to be ulcerated and polypoid ; numerous adult worms were found in the portal vein and its ramifications throughout the liver. The abdominal glands in this case also contained many ova.

The third, a man of 40 years, had a paratyphoid infection but no intestinal symptoms on admission. No ova were found in the stools, but again at autopsy many were found in the mesenteric glands ; there were very few intestinal lesions.

The pathology of these cases in some respects conformed to that of a *S. japonicum* rather than that of a *S. mansoni* infection ; this may prove to be a feature of Sudanese *S. mansoni* infections. *A. R. D. Adams*

KENAWY, M. R. **The Syndrome of Cardiopulmonary Schistosomiasis (Cor Pulmonale).** *Amer. Heart J.* 1950, May, v. 39, No. 5, 678–96, 11 figs. [15 refs.]

Ova of *Schistosoma mansoni* or of *S. haematobium* in the lungs cause arteritis of the pulmonary arterioles ; in the case of the former parasite this is invariably associated with hepatic cirrhosis of bilharzial origin, and often with splenomegaly. The widespread obliterative pulmonary arteritis which results from the continued entry of ova into the arterioles in time leads to a marked rise in pressure in the pulmonary artery, hypertrophy of the right ventricle and, in due course, right heart failure. The clinical features of the condition are not uncommon in Egypt and may simulate those due to rheumatic or congenital heart disease, hence the importance of accurate diagnosis.

The number of detected cases of cardio-pulmonary schistosomiasis is steadily increasing with growing recognition of the syndrome, but right heart failure due to it is much less common than that due to rheumatic disease in Egypt, where the latter is prevalent ; the incidence of these two types of heart failure there is in the ratio of 1 to 23·8. A *S. mansoni* infection is more commonly the cause of cardio-pulmonary schistosomiasis in clinically diagnosed cases than is a *S. haematobium* infection. In some cases attributable to *S. haematobium* infection the name " Ayerza's disease " was given by SHAW and GAREEB [this *Bulletin*, 1938, v. 35, 665] and by others ; this nomenclature is objectionable because cyanosis is present only terminally or when there is a complicating secondary pulmonary infection. DAY [this *Bulletin*, 1937, v. 34, 863] named the condition " cardio-pulmonary bilharziasis ", but " bilharzic cor pulmonale " is an even better name as it explains the mechanism of the heart failure.

An account is given of 7 cases of cardio-pulmonary schistosomiasis ; in 2 of these cases the presence of a *S. mansoni* infection was established and in one that of a *S. haematobium* infection ; the remaining 4 patients harboured both parasites. One of the cases infected with *S. mansoni* came to autopsy, and the pathological findings in this case are recorded ; it is one of the few in which the post-mortem findings are available.

The diagnosis of cardio-pulmonary schistosomiasis during life is made on full clinical investigation and on radiological examination of the chest contents. The age incidence is usually between 12 and 35 years, and the condition is most prevalent in males. The symptoms are usually cardiac or pulmonary, and most patients have signs suggesting a congestive heart failure. Haemoptysis occurred in 2 of the author's cases ; this symptom has not previously been recorded, and asthma was a symptom in one of these two. Cyanosis is not constant in cardio-pulmonary schistosomiasis ; it occurred in only 2 of the author's 7 cases. Eosinophilia is unusual in advanced cases.

Radiological examination shows enlargement of the right ventricle, and a heart shape of " mitral configuration " with a characteristic bulging of the pulmonary conus upwards. There may be a triangular shadow in the right hilum due to enlargement of the right branch of the pulmonary artery. The lungs are diffusely and finely mottled in any part, and bilharzial tubercles resembling miliary tubercles may be visible. Tartar emetic treatment causes accentuation of the shadows to an extent suggesting broncho-pneumonic changes ; these are probably of allergic origin and are reversed when the treatment is stopped.

The electrocardiographic changes are more pronounced than those seen in the commoner varieties of right ventricular strain. They are minimal in mild and early cases, but when there is an organized thrombus in the hilar pulmonary branches the tracings resemble those of acute cor pulmonale. No disturbance of conduction or rhythm was observed.

The conditions causing diagnostic confusion are (1) rheumatic mitral incompetence, (2) patent interauricular septum, (3) patent ductus arteriosus, and (4) cardiac type beriberi. Their differentiation is facilitated by suitable examinations for an associated visceral bilharziasis.

In treatment, digitalis and mercurial diuretics should be given, but *not* antimony, as this is contraindicated in heart failure. Specific treatment early in schistosomiasis will forestall the development of the late cardio-pulmonary complications. The author considers antimony a myocardial poison, and so he specifically warns against the use of the "so-called intensive antimony treatment".

[This paper contains much detail which cannot be summarized. It should be consulted in the original by those interested in the subject.]

A. R. D. Adams

JULLIEN-VIEROZ, R., CAUBET, P. & MONTESTRUC, E. Contribution à l'étude des splénomégalies à Schistosomum mansoni. [**Observations on Splenomegaly in** *Schistosoma mansoni* **Infections.**] *Arch. Inst. Pasteur de la Martinique.* 1948, July, v. 1, No. 3, 3–14. [27 refs.]

Malaria and schistosomiasis are common causes of splenomegaly in the tropics. The absence of malaria parasites from the blood does not exclude malaria as the cause of an enlarged spleen, neither does the discovery of schistosome ova in the stools or urine prove bilharzial disease to be the cause of it.

Schistosoma mansoni is the only bilharzial parasite of man found in Martinique, and *Planorbis guadaloupensis* is its vector. Schistosomiasis is prevalent in the north of the island and there is no malaria where it is most intense. Details are given of three patients from this region who had splenomegaly. The first of these, a man of 35 years, gave a long history suggestive of intestinal schistosomiasis, but no ova were found in the stools; a large spleen was removed and he died from shock as a result. The spleen was found to be much fibrosed, the follicles were reduced in number and sclerotic, and there was reticular hyperplasia of the Banti type.

The second, a girl of 15 years, gave a history of dysentery with the passage of ova of *S. mansoni* in the stools for a year and a half. A grossly enlarged spleen was removed surgically; in this case there was little fibrosis of the capsule and trabeculae, but reticular hyperplasia and cellular infiltration of the red pulp were present. The follicles were diminished in number but not sclerosed.

The third patient, a woman of 30 years, gave a history of dysentery with the passage of ova of *S. mansoni* in the stools during the previous two years. A very large spleen was removed surgically; in this case there was some capsular thickening with subcapsular haemorrhages; the trabeculae were sclerosed, the follicles were diminished in number and surrounded by fibrous tissue, and there was reticular hyperplasia of the cords.

In addition to these three local cases, an Indian woman of 22 years from Guadeloupe was seen. She had had dysentery with the passage of *S. mansoni* ova in the stools for 6 years. A much enlarged spleen was removed; the capsule was found to be thickened, the follicles were undamaged though some were surrounded by a haemorrhagic zone with local sclerosis, and there was slight hyperplasia of the pulp cords.

The principal pathological lesions common to the spleens from these cases of bilharzial splenomegaly were:—

(1) Atrophy of the lymphoid follicles with the disappearance of their germinal centres, but not the lymphoid hyperplasia described by some workers.

(2) a reticular hyperplasia of the red pulp cords which tended to obliterate the sinuses.

Medical treatment for the schistosomiasis will not arrest the development of splenomegaly once it has begun ; splenectomy in these cases should be performed before ascites and a severe anaemia develop. An account is given of the surgical technique for spleen removal in such cases. *A. R. D. Adams*

Oliver González, J. & Thillet, C. J. **The Effect of Necroton on** *Schistosoma mansoni* **Infection in Mice.** *Puerto Rico J. Pub. Health & Trop. Med.* 1950, June, v. 25, No. 4, 411–14. [Spanish version 415–18.]

White mice were infected experimentally by intraperitoneal injection with 150–200 cercariae of *Schistosoma mansoni* per mouse, and during the second and third weeks after exposure treatment with Necroton was begun and continued for two to three weeks, the dosage being 1 cc. intraperitoneally each day. Another group of mice was similarly treated in the eighth week after exposure. At autopsy the degree of cirrhosis of the liver was estimated macroscopically and the adult worms from mesenteric and portal veins were counted. Untreated controls were also examined. The results indicate that the treatment had a reducing effect on the cirrhosis both individually and collectively, as compared with untreated mice. The average number of adult worms collected from treated mice was also less than that in untreated animals.

It is thought that the substance appears to have the effect of preventing cirrhosis and causing liver regeneration, but as the condition was the result of an infection of short duration and for other reasons it cannot be concluded that liver cirrhosis in human beings would react similarly to the treatment. The authors state, however, that " it is conceivable that Necroton may be of value in chronic schistosomiasis ". It is pointed out that the drug is non-toxic and has been used extensively in human beings for the treatment of other hepatic disturbances. [Necroton is the trade name of a purified and concentrated form of the antinecrotic and antitoxic substances isolated from the liver by Forbes and McConnell (*Proc. Soc. Exper. Biol. & Med.*, 1937, v. 36, 359).]

J. J. C. Buckley

Berry, E. G., Nolan, M. O. & Oliver González, J. **Field Tests of Molluscacides against** *Australorbis glabratus* **in Endemic Areas of Schistosomiasis in Puerto Rico.** *Pub. Health Rep.* Wash. 1950, July 28, v. 65, No. 30, 939–50. [12 refs.]

" Eleven chemical compounds which proved effective in killing *Australorbis glabratus* in the laboratory in dilutions of 10 ppm or less were tested on this same species of snail in its natural environment in Puerto Rico. Six of these proved to be very effective molluscacides although the present price of four of them (2,4,6-triiodophenol, 2,4,6-triiodophenol sodium salt, 2,4,6-tribromophenol, and pentabromophenol) may prohibit their use on a large scale. Two compounds (sodium pentachlorophenate and copper pentachlorophenate) are excellent molluscacides and their cost is reasonable. In a stream near Los Peña, sodium pentachlorophenate at 9·5 ppm calculated on a 6-hour flow-rate dose destroyed all snails for a distance of 1½ miles downstream in spite of the entrance of three untreated tributary streams within this area. Embryos within the snail eggs were also killed. The compound was lethal to catfish, guppies and eels, but apparently did not affect crayfish.

" The toxicity of the effective compounds for mammals is under further study, and field trials are being extended to other areas."

Oliver González, J., Biaggi, N., Acevedo, Carmen, Mariotta, Delia A., Hernández Morales, F., Santiago Stevenson, D. & Pérez Santiago, E. **Studies on Manson's Schistosomiasis in Puerto Rico. I. Result of Control Methods in an Endemic Area.** *Puerto Rico J. Pub. Health & Trop. Med.* 1950, June, v. 25, No. 4, 387–96, 2 charts. [Spanish version 399–410.]

"1. An area endemic for Manson's schistosomiasis in Puerto Rico was selected for a study of control measures; this area is known as "Los Peña" and is located at Sabana Llana, in the municipality of Río Piedras.

"2. The methods of control applied were: (a) treatment of infected persons; (b) health and medicosocial education; (c) installation of sanitary privies; (d) strengthening the water supply; (e) biological control of the snail population in the neighboring creek.

"3. The incidence of infection was 44·6 percent at the time the study was initiated in February, 1947. By September, 1949, it had been reduced to 4·5 percent, which decrease may be attributed chiefly to the treatment of infected cases and to health and medicosocial education. Whether or not the other methods of control mentioned in the preceding paragraph also contributed to the lowering of the rate of infection will have to be determined later.

"4. The incidence of infection among children in the six to 15-year-old group was brought down from 60 percent to 8·9 percent. The fact that infection in this age group has remained at low ebb after a period of two and a half years speaks well for the methods applied, especially the health and medicosocial teachings. New infections would have readily shown up in this age group.

"5. Treatment and educational measures have thus proved adequate in the control of Manson's schistosomiasis in Puerto Rico. However, the first should be given intensively and to all affected persons. Health and other educational measures should be applied in accordance with the specific needs and circumstances of the area involved."

Roberts, Enid W. **Studies on the Life-Cycle of *Fasciola hepatica* (Linnaeus) and of its Snail Host, *Limnaea (Galba) truncatula* (Müller), in the Field and under Controlled Conditions in the Laboratory.** *Ann. Trop. Med. & Parasit.* 1950, July, v. 44, No. 2, 187–206, 2 text figs. & 6 figs. on 2 pls. [49 refs.]

Field and laboratory studies on *Limnaea truncatula* and infection with *Fasciola hepatica* were carried out with a view to augmenting present knowledge of their behaviour in Great Britain. Observations were made on the bionomics of the snail in the laboratory, and a small farm in Denbighshire was chosen for field studies during the period March 1947 to November 1948. For the very detailed studies the original paper should be consulted. The conclusion of immediate practical interest to readers of this *Bulletin* is that control measures could be effected by the use of molluscicides during May and again during the late summer. Such measures should be supplemented by routine dosing of all sheep having access to the areas where the snails are prevalent.

J. J. C. Buckley

García Barón, A. Un caso de extracción operatoria del colédoco de fasciolas hepáticas. [*Fasciola hepatica* **removed at Operation from the Bile Duct.**] *Rev. Clín. Española.* 1950, Aug. 31, v. 38, No. 4, 312, 1 fig.

See also this *Bulletin*, 1950, v. 47, 555.

Raman, T. K., Ramamurthi, B. & David, C. V. **Cysticercosis.** *Indian Physician.* 1950, Aug., v. 9, No. 8, 207–22, 6 figs. on 2 pls. [19 refs.]

The authors give an up-to-date and orthodox description of cysticercosis which is unsuitable for summary. They have, however, reported seven cases of cysticercosis encountered in Visakhapatnam, South India ; the disease is uncommon among Indians though relatively common in the British soldier on service in India. Of these seven cases, in five the diagnosis was confirmed histologically, in two of these five *post mortem*, and in the other three by biopsy of cysticercal nodules. In the remaining two cases the diagnosis was circumstantial, as both had epileptic fits of comparatively recent origin and numerous nodules suggestive of cysticercosis.

In one case, diagnosed in the anatomy room, there was no clinical history, and in the fatal case the patient had died of bacterial endocarditis ; there were no symptoms suggestive of cysticercosis. Of the remaining five cases, in three the first evidence was epilepsy and in one Jacksonian fits. The fifth patient had what appeared to be classical beriberi, and only responded slowly to treatment, including vitamin B, which seemed to have little specific effect : later he was re-admitted with muscular atrophy and peripheral neuritis, and the diagnosis was made by biopsy of nodules.

In no case was there any radiological evidence of cysticercosis and none of the dissected cysticerci showed any calcification. *L. E. Napier*

Colorado Iris, R., Treviño, A., Domínguez, R. & Mazzotti, L. La semilla de calabaza en el tratamiento de las teniasis. [**Pumpkin Seeds in the Treatment of Taeniasis.**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1950, Mar., v. 11, No. 1, 57–9.

The English summary appended to the paper is as follows :—

" Eighty five patients infected with tapeworms were treated with an aqueous extract of pumpkin seeds. Complete removal of the worms was obtained in 60 cases (70%). This percentage is probably higher because we were unable to follow up 19 patients in whose feces the heads of the worms were not found after the treatment."

Lippi, M. Rilievi sull' echinococcosi nella provincia di Cagliari. [**Echinococcosis in the Province of Cagliari.**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1950, May, v. 31, No. 5, 337–43, 1 chart. English summary (8 lines).

Sardinia is notable as an island where *Echinococcus* infection is rife. The reasons for this are that the country is largely agricultural and pastoral and that almost every family has its dogs which are regarded as part of the family ; they eat and drink from the same utensils, they sleep on the same beds, the people caress them, kiss them, let them lick their hands and, in fact, do everything likely to foster the spread of infection from animal to man and, indirectly, vegetables when growing are soiled by dogs. Further, dogs are accustomed to frequent slaughterhouses and feed on infected offal.

The author has studied the records of the hospitals of the capital, Cagliari, and shows how the number of patients admitted for hydatid has increased steadily from 1944 onwards, the figures for successive years being 37, 58, 68, 89, 125 and, in the first half of 1949, 71. The average fatality has been 8·2 per cent., ranging between 16·2 in 1944 and 5·6 in 1949. The average stay in hospital has been 7 weeks. The increase in cases is ascribed to the dispersal of the people from the town to the country on account of the war, to poverty

and low living, to the familiarity and close association with dogs, but above all to ignorance of the mode by which infection is acquired, which only educational enlightenment can remedy. *H. Harold Scott*

Piaggio Blanco, R. A., Dubourdieu, J. J., Dighiero, J., Joaquin Canabal, E. & Grosso, O. F. Quiste hidatico de la auricula derecha. Equinococosis pulmonar metastatica y corazón pulmonar crónico hidatico causado por una obstrucción parasitaria de la arteria pulmonar izquierda y de sus ramas. [**Hydatid Cyst of the Right Auricle. Pulmonary Secondary Echinococcal Disease and Parasitic Obstruction of the Left Pulmonary Artery and its Branches.**] *Arch. Uruguayos de Med., Cirug. y Especialidades.* 1950, June, v. 36, No. 6, 530–51, 8 figs. [18 refs.] English summary.

Carlos del Campo, J. Cor pulmonale hidatico. Comentarios quirúrgicos. [**Cor Pulmonale of Hydatid Origin.**] *Arch. Uruguayos de Med., Cirug. y Especialidades.* 1950, June, v. 36, No. 6, 552–7.

Lang, F. Ein Fall von primärem Echinococcus des Samenstranges. [**A Case of Primary Echinococcal Infection of the Spermatic Cord.**] *Wien. klin. Woch.* 1950, May 12, v. 62, No. 19, 333.

Lie Kian Joe & Bras, G. *Ancylostoma caninum* **in Indonesia.** *Documenta Neerlandica et Indonesica de Morbis Tropicis.* Amsterdam. 1950, Sept., v. 2, No. 3, 288.

" The presence is reported of one female *A. caninum* in the intestinal contents of an Indonesian woman. This was the only case among several hundreds of autopsies in which the intestinal helminths were minutely examined."

Petrilli, F. L. Sulle parassitosi intestinali riscontrate nel territorio del comune di Sestri Levante. Nota I. La diffusione dell'infestione da anchilostoma. [**Intestinal Parasitism in Sestri Levante. I. Ankylostomiasis.**] *Ann. d. San. Pubblica.* Rome. 1950, May–June, v. 11, No. 3, 927–42, 1 chart & 1 coloured folding map. [16 refs.] English summary (2 lines).

The Commune of Sestri Levante is the most eastern part of the Province of Genoa. The land is largely given up to kitchen gardens, vineyards and olive plantations. The population is stated to be 16,237 or 464 per sq. kilometre, with a floating population of 2,200 in the summer and 990 in the winter. Nearly half the working population (44 per cent.) are engaged in metal industries, iron and copper; about one-fifth (21 per cent.) in agriculture, and one-seventh (14 per cent.) in commerce, fishing, etc.

Infestation by hookworms is, on the whole, not severe, because the general living conditions are good and nutrition up to standard. The people were, on the whole, not very co-operative or enthusiastic as regards the investigation. In a few places the percentage examined might be high, over 80, but the average was only 8 per cent. The method used was a simple concentration in strong salt solution.

Altogether between the winter of 1947 and the autumn of 1949, 1,268 were examined, 605 males and 663 females, and the positive figures were 167, 80 and 87 respectively, or 13 per cent. in each case. Excluding children in schools, 899 were examined, 449 males, 450 females, and the numbers positive were 140 (16 per cent.), 67 (15) and 73 (16). The highest positive percentage was in Pila, 21·5; in Capoluogo rural zones it was 15·4, in urban zones only 1·1; in San Bernardo it was 2·3 per cent. The mine galleries are damp but the operatives have to wear shoes or clogs, and latrines are provided. In many

cases the finding of ova came as a surprise, for the subjects made no complaint and were going about their work normally. The relations between infestation and age were noteworthy [but the totals examined at the different ages are not given] ; none was infested under 4 years of age ; after that the percentages in successive quinquennia were 9·09, 7·6, 7·1, 21·8, 21·0, 28·5, 11·3, 9·7 (40–44 years), 34·4 (45–49 years), 17·6, 22·5. According to a table, at age 10–14 years all the positives were females ; at 15–19 years all were males [the liability to fallacious deduction when the totals examined are omitted is very obvious here].

Agricultural workers do not use footwear and infection takes place through the skin of the feet and also, possibly, orally by soiled hands and the eating of infected foodstuffs.

Preventive methods suggested are exclusion of those infested from working in the mines and thus cutting out one source ; also there should be a register of all workers and the results of periodic examinations of faeces, say once a month, a laboratory nearby for carrying out the examinations and a place for treatment. *H. Harold Scott*

Petrilli, F. L. Sulle parassitosi intestinali riscontrate nel territorio del comune di Sestri Levante. Nota II. Diffusione dell'ascaridiosi ed altre parassitosi. [**Intestinal Parasitism in Sestri Levante. II. Ascariasis and other Helminthiases.**] *Ann. d. San. Pubblica.* Rome. 1950, May–June, v. 11, No. 3, 943–9. [29 refs.] English summary (2 lines).

The author examined the same number, 1,268, as in the preceding paper. The number infested with *Ascaris* was high, 728 (57 per cent.) of whom 322 (53 per cent. of the 605) were males and 406 (61 per cent. of the 663) were females. Of those in the schools of Sestri Levante, 369 in all, 156 boys and 213 girls, 142 (38·4 per cent.) were positive, 64 (41·0) boys and 78 (36·6) girls. In the Riva school, of 201 examined, 101 boys and 100 girls, the corresponding numbers positive were 63, 29 and 34 or in percentages, 31·3, 28·7 and 34·0. In S. Vittoria school 168 were examined, 55 boys and 113 girls ; 74 were positive (47·0 per cent.), 35 (63·6) boys and 44 (38·8) of the girls [this makes 79]. *Trichuris trichiura* infestation was not great ; of the 1,268 examined only 208 (16 per cent.) were positive, 91 (15) males and 117 (18) females. In the schools the numbers examined were too small for consideration, only 33 in all. *Enterobius vermicularis* infestation also was almost negligible, only 27 (2·1 per cent.) being positive and only 10 in the schools.

Ova of *Hymenolepis nana* were found in 0·16 per cent. only (*i.e.* in two) ; of *Heterodera radicicola* in 0·78 per cent. (? 10 cases), and of *Taenia saginata* in 0·31 per cent. (? 4 cases).

Microscopical examination of the subungual dirt of 27 persons who had been found positive by faecal examination revealed *Ascaris* ova in 23 and *Trichuris* ova in two.

Subject to the proviso mentioned in the preceding abstract that the totals examined at the different ages are not stated, the percentages infested by *Ascaris* and *Trichuris* are of some interest. Of those between 5 and 9 years of age 82·9 per cent. were infested with *Ascaris* ; of those between 20 and 24 years 80 per cent. and of those between 35 and 39 years 77·5 per cent. For *Trichuris* the 5–9 years still come first, with 29 per cent., the 45–49 group next with 28·1 (for *Ascaris* this group is only 42·3) and those over 60 years 24·4 per cent.
H. Harold Scott

Garcia Barón, A. Aportación a la casuistica de la ascaridiosis de las vias biliares. [**Ascaris in the Bile Ducts.**] *Rev. Clín. Española.* 1950, Sept. 15, v. 38, No. 5, 375–6, 1 fig.

An account of 3 cases in Spain.

el Zahawi, S. & Ovanessian, G. **A Tumour Mass due to Ascaris Larvae.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1950, Sept., v. 44, No. 2, 229–30.

The authors, in Iraq, refer to four unusual lesions produced by *Ascaris*. In the first, numerous adult worms weighing more than 2 kgm. in aggregate produced a fatal intestinal obstruction in an Arab boy by occluding the lumen of the intestine. The second case, that of five *Ascaris* occluding the lumen of the appendix, has already been noted in this *Bulletin*, 1939, v. 36, 321. In the third case, a patient attended hospital with an adult worm protruding from the chest wall, probably from the pleural cavity : it had produced reactionary degeneration and necrosis of the surrounding tissues.

The fourth case, which was recent and which is the main purpose of the authors' paper, is described in more detail. It relates to a soldier of 30 who had suffered from *Ascaris* infestation for 2 years and had had some treatment. For 4 months he had noticed a swelling midway between the symphisis pubis and the umbilicus : this increased to a diameter of 1·5 cm. and was hard and slightly painful. Surgical intervention revealed that it was a nodule situated deep in the fascia, and attached to the deep muscles of the abdominal wall. In section, larvae of *Ascaris lumbricoides* were found, having typical cuticle and well developed muscles of the intestinal tissue : the masses were surrounded by granulation tissue and reactive cells.

It is stated that this case was unusual in that " the parasite changed its normal route and entered the general circulation."

[Complete evidence of identification of the larvae as being those of *Ascaris lumbricoides* is not given. Clinically and histologically the picture has also something in common with an onchocercal nodule, but such a condition would not ordinarily be expected in that geographical area.]

H. J. O'D. Burke-Gaffney

Orenstein, A. J. **A Contribution to the Discussion on the Hazard of** *Ascaris* **Infection from Sewage.** *Pub. Health.* Johannesburg. 1950, Jan., v. 14, No. 1, 29–32.

Hogg, Elizabeth S. **A Preliminary Study of Ova and Cysts in Cydna Digested Sludge.** *Pub. Health.* Johannesburg. 1950, Jan., v. 14, No. 1, 27–8.

Sun-drying digested sludge in a layer 1½ in. thick for 3 months was shown to be effective in destroying the eggs of *Ascaris lumbricoides*. Layers of 3 in. and 4½ in. thickness treated in the same way still contained some viable eggs but these were very much reduced in number. *J. J. C. Buckley*

Canet, J. La filariose humaine en Cochinchine : recherches épidémiologiques en pays Moi. [**Human Filariasis in Cochin-China. Epidemiological Studies in the Moï Country.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 3/4 & 5/6, 216–26 ; 332–54, 1 fig. [43 refs.]

Hitherto studies on filariasis in Indo-China have been confined to Tonking, where both *W. bancrofti* and *W. malayi* have been recorded. The author investigated filariasis in Southern Indo-China, particularly in the Moï country which is characterized by the presence of large rubber plantations at the foot-hills of the hinterland plateaux. In the region where the work was carried out,

the population comprises three distinct groups belonging to two different races, namely, (1) Tonkingese labour from the Northern Deltas, (2) Cochin-Chinese from the urban or rural parts of Lower Cochin-China and (3) the indigenous Moïs-Stiengs, of Malaya-Polynesian origin, who inhabit the forest at the edge of the plantations. A fourth group of 500 Cambodians was also included in the study.

Examination of the Tonkingese revealed 9 to 15 per cent. with microfilariae of *W. bancrofti* in night blood and of these 10 per cent. showed clinical filariasis, principally of the uro-genital system. Among the Cochin-Chinese the incidence of *W. bancrofti* is estimated as less than 1 per cent. and 500 Cambodians proved to be entirely uninfected. Particular attention was given to the Moïs-Stiengs and the results obtained open a new chapter in the study of filariasis in Indo-China. Altogether, 7,000 were examined clinically and 3,743 of these underwent blood examination. Of 43 villages in the Honquan sector, 29 were affected, indicating a widespread distribution of filariasis among the Moïs-Stiengs. Day blood examination gave 2·38 to 33 per cent. positives, averaging 9·91 per cent. in adults (12·54 in males and 6·93 in females) and 3·78 per cent. in children. Night blood examinations gave higher indices, but in one village the percentages infected were 30·92 for day blood and 40·86 for night blood, suggesting that more than one species of filarial infection might be involved. However, only *W. bancrofti* was identified and apparently *W. malayi* does not exist in this population although it is present, with the exception of Siam, in all the neighbouring countries. The high infection rate in Moïs-Stiengs is far greater than any previous records from Indo-China and in this respect the filariasis resembles more that of the Pacific Isles. It is suggested that this resemblance may support the idea of the Polynesian origin of the Moïs. Other striking characteristics of this filariasis are the almost complete absence of symptoms and the generally light infection in individuals, of 2 to 3 microfilariae in 20 fields.

Eosinophilia averaged 9 per cent. in infected Moïs, with a maximum of 20 per cent., a slightly higher figure than that recorded for Tonkingese.

The chief vector appears to be *Culex fatigans*, in which a natural infection rate of 6 per cent. was found in mosquitos collected in a heavily infected Stieng village. *J. J. C. Buckley*

Schlosser, R. J. **Photomicrography of the Developing Larvae of *Wuchereria bancrofti* in a Mosquito Host of the South Pacific Area.** *J. Biol. Photographic Ass.* New York. 1950, Feb., v. 18, No. 1, 12–15, 3 figs.

This paper gives technical details and two photographic illustrations of the photomicrographic processes referred to in the author's earlier paper [this *Bulletin*, 1950, v. 47, 386]. There is also an excellent reproduction of a photomicrograph of a larva of *W. bancrofti*, showing stages in preparation of the print. *H. J. O'D. Burke-Gaffney*

Hernández Morales, F., Casas, Carmen B. & Garcia Sanz, Maria. **Thorn Test in Patients with Eosinophilia related to Parasitic Infection. Preliminary Report.** *J. Amer. Med. Ass.* 1950, Sept. 30, v. 144, No. 5, 379–80.

" Use of the Thorn test for adrenal insufficiency, using epinephrine to detect the changes in circulating eosinophils in human patients with filariasis and bilharziasis has been reported.

" In 10 of 12 persons the number of eosinophils decreased over 40 per cent after a four hour rest period after the injection of 0·3 mg. of epinephrine. This result may indicate that parasitic infections may not interfere with such a test

for adrenocortical function. A future communication will deal with a similar study in which pituitary adrenocorticotropic hormone [ACTH] will be used instead of the adrenergic drug."

BERTRAM, D. S. **Studies on the Transmission of Cotton Rat Filariasis. III. A Natural Method for Quantitative Transmission and its Application to a Chemoprophylactic Test of some Drugs. With a Statistical Analysis** by P. ARMITAGE. *Ann. Trop. Med. & Parasit.* 1950, July, v. 44, No. 2, 107–23.

This is a continuation of a series of papers on the experimental transmission of filariasis to cotton rats [this *Bulletin*, 1950, v. 47, 482]. By counting the number of worms present in a sample of 50 mites beforehand, and by counting the number of gorged mites collected from a rat after feeding it was possible to calculate the number of worms which each rat has received. In a series of 39 such rats, the number calculated was compared with the number of worms found at autopsy. The agreement was fairly good although in over 70 per cent. of the rats fewer worms were found than had been calculated. Occasionally the discrepancies were wider. Apparently no transmission takes place from mites which are eaten by the rats.

The methods which had thus been evolved were used to test the prophylactic action of stilbamidine, suramin and p-melaminyl phenyl stibonate [MSb] in an experiment which has already been reported by KERSHAW *et al.* [this *Bulletin*, 1949, v. 46, 488]. Prophylactic action was observed with MSb but not with the other two compounds.

An appendix by Armitage discusses the statistical analysis of the data.

F. Hawking

NWOKOLO, C. **Studies in Onchocerciasis. [A Review of 100 Cases from Enugu District of Eastern Nigeria].** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1950, Mar., v. 43, No. 5, 493–501, 8 figs. on 2 pls. [17 refs.]

This paper could more accurately be described as a discussion on the clinical aspects of onchocerciasis based on 100 cases seen in Enugu, Nigeria.

The three main features of American onchocerciasis are the onchocercomata (nodules), onchodermatitis (the rash), and onchophthalmia (ocular manifestations).

In Enugu onchodermatitis is the commonest manifestation. The earliest symptom is pruritus [occasionally spelt "pruritis"] and when the skin is scratched papulo-macules appear. In a week or so the papulo-macule develops into a definite papule which is often infected and becomes a pustule, or it may heal. The next stage is a small depigmented scar which repigments slowly, and often incompletely, so that the skin presents a mottled or mosaic pattern. There is often some associated oedema but this does not persist, and the elephantiasis associated with *Wuchereria bancrofti* infection is never seen.

The lesions may be regional or generalized, but they often start as regional lesions in one limb and spreading up the limb eventually become generalized. Out of a total of 59 cases, 20 were regional. Twenty-one cases were associated with onchocercomata. The face invariably escapes. The lesions may remain for a year, disappear and return again.

The associated pruritus may be very severe and is usually refractory to anti-pruritic remedies. The itching was made worse by rain, by threatened rain, by perspiration, by removal of clothes, at night, or by bathing. From 3 to 7 per cent. of persons with onchocerciasis show onchodermatitis. The eosinophile percentage was 30 to 40 per cent. in subjects with onchodermatitis.

Onchophthalmia is relatively common in the American disease, especially in cases of onchocercomata of the head. There was no case among the author's 100 cases, but there were seven cases of onchocercomata of the scalp.

The microfilariae of *Onchocerca* have been reported in the pus of cases of myositis. None was found in several cases of myositis examined in Enugu hospital. In one case microfilariae were found in the synovial fluid of a knee joint.

The 89 nodules observed in the cases were distributed as follows : iliac crest, 22 ; ribs, 17 ; trochanters, 13 ; spine, 11 ; knees, 10 ; scalp, 7 ; scapulae, 3 ; sacro-iliac joints, 2 ; root of neck, 2 ; ischial tuberosity, 1 ; and wrist, 1.

The only effective treatment measure was the surgical removal of the onchocercomata ; 50 per cent. of cases were relieved of onchodermatitis within three weeks by this measure, and 40 per cent. partially relieved. Hetrazan was not used. *L. E. Napier*

Burrows, R. B. **On the Estimation of *Trichuris* Worm Burdens in Patients.** *J. Parasitology.* 1950, June, v. 36, No. 3, 227–31.

Several estimates of the numerical relation between the ova in the faeces and the number of adult *Trichuris trichiura* in the intestines have been made ; these have usually been based on post-mortem examinations. It was claimed by some workers that about 300 ova per gramme of faeces represent one female worm.

In the present study, enteric sealed tablets of emetine hydrochloride were given and the estimate based on the relation between the number of eggs per gramme of faeces before treatment and the number of dead adult worms recovered.

From an original series of 13 patients, 4 were excluded for the reasons that they passed no worms, very few worms or only fragmented worms. To exclude these cases was fair enough, but they suggest that there are considerable fallacies in the whole procedure. Three to six specimens of faeces were examined by the Stoll method. The worms passed after treatment were counted, measured and the sex was identified.

A total of 4,582 worms were passed by the 9 patients. Of these worms 54 per cent. were females. The actual number of ova per gm. per female adult worm varied from 35 to 355 and the corrected figure from 65 to 497 : the mean figures were 154 and 225 ova, respectively. The average length of the female worms in individual patients varied from 29·4 to 41·4 mm. and the number of ova was correlated positively with the average size.

The author concludes, on the basis of his own observations and those of others, that the average number of ova per gramme of faeces is probably between 200 and 300 per female worm, and that variations are due to the size of the worms, the intensity of the infection, and the age of the infection. Unless a series of specimens is examined, the size of the stool is an additional factor.
L. E. Napier

Schüffner, W., Swellengrebel, N. H. & Bool, J. **Retrofection in Oxyuriasis. Conclusions.** *J. Parasitology.* 1950, Aug., v. 36, No. 4, 391–3, 1 fig.

This paper contains an extension of the knowledge of " retrofection " in oxyuriasis [this *Bulletin*, 1949, v. 46, 960], by observations on a new volunteer and the continuation of a previous experiment. In the former, the pre-patent period of 76 days was confirmed, after intra-anal inoculation with hatched larvae of *Enterobius vermicularis*. It also showed that the female worms may live for 101 days. In the volunteer of the previous experiment, the character of the infection changed in its second year, from a rhythmical appearance of

recidives to rapid recurrences without rhythm. At this juncture experimental prophylaxis was begun, consisting of anal washing 3 times daily, *i.e.*, every 8 hours, and was continued for 101 days. The effects of this " anal toilette " became apparent after 60 days when the recidives began to decrease, to one every 4 days, and later to one every 8 days. It is pointed out that the ideal prophylaxis should consist of anal washing every 6 hours, *i.e.*, 4 times daily, to ensure the removal of all eggs before hatching takes place and to terminate the infection promptly. " Experience allows one to assume that clean adults do not owe their chronic oxyuriasis to finger or dust eggs, but entirely to retrofection."

J. J. C. Buckley

SCHMIDT, J., SCHNEID, G. & MENDHEIM, H. Uber die Verbreitung von Wurmeiern durch Papiergeld. [**The Transmission of Worm Eggs by Paper Money.**] *Ztschr. f. Hyg. u. Infektionskr.* 1950, July 9, v. 131, Nos. 2/3, 316–17.

The authors refer to the literature regarding the dissemination of micro-organisms and worm eggs by paper money and in particular to the work of DOLD and THEMME [this *Bulletin*, 1949, v. 46, 761].

They examined 120 worn and soiled 5- and 10-pfennig notes by means of the " cellophane " tape technique and in 15 cases they found eggs of *Enterobius* and in one case eggs of *Ascaris*.

They conclude that the possibility of worm eggs being transmitted by the ordinary use of paper money has been demonstrated.

H. J. O'D. Burke-Gaffney

KLOSA, J. Ueber neuere Oxyurenmittel. [**Newer Forms of Treatment for Enterobiasis.**] *Ztschr. f. ärztl. Fortbildung.* 1950, Sept. 15, v. 44, Nos. 17/18, 473–8. [21 refs.]

After some remarks on the many remedial drugs which have been tried in the past for dealing with infestation by *Enterobius vermicularis*, the author speaks in more detail of hexylresorcinol, phenothiazine and benzene hexachloride. He speaks with particular favour of the last ; he gives it in doses of 30–50 mgm. daily for adults ; 10–20 mgm. for children, on three successive days and repeated, if necessary, after an interval of 4–5 days. In one record which he gives, 145 out of 148 were freed of the worms by the first course and re-infection did not occur. The drug appears to be harmless ; the author took as much as 120 mgm. daily for 4 weeks without any harmful side-effects.

H. Harold Scott

DEFICIENCY DISEASES

JANSSEN, E. & LE ROUX, J. S. **The Electrocardiographic Changes in the Syndrome of Malignant Malnutrition. A Preliminary Report.** *South African Med. J.* 1950, Sept. 9, v. 24, No. 36, 762–4, 3 figs.

Janssen and le Roux of the Department of Paediatrics, University of Pretoria, studied electrocardiographic records on 50 children suffering from kwashiorkor (malignant malnutrition). Serial E.C.G.'s were made, the standard and precordial lead IVF being selected. The most conspicuous change observed was a decrease in the QRS complex and T wave. All showed some abnormality of the major deflections, especially the T wave which was of low amplitude, isoelectric or diphasic. The heart rate varied between 107 and 166 per minute.

There appeared to be some relationship between the severity of the disorder and the degree of E.C.G. changes. It was difficult to assess the effect of the treatment by vitamin therapy on the records. In the majority, the E.C.G. returned to normal by the third or fourth week, by which time the nutrition of the subject had been restored. *M. Gelfand*

Walker, A. R. P. & Arvidsson, U. B. **Iron Intake and Haemochromatosis in the Bantu.** [Correspondence.] *Nature.* 1950, Sept. 9, 438–9.

It has been shown that in rats when the animals are kept on an adequate diet there is no deposition of haemosiderin in the liver even when considerable amounts of iron are added to the diet. But on a poor diet, particularly one containing much maize, there is some deposition with no added iron and a massive deposition when iron is added to the poor diet. Evaluation of Bantu diets suggests an average dietary iron content of 15–30 mgm. daily. The present investigation shows that owing to the common use of iron cooking pots and utensils the iron intake may be increased to at least five times that contained in the original foodstuffs. Analysis of diets consumed has given values of 100–150 mgm. of iron per day and this high level of ingestion has been confirmed by finding faecal iron excretion from 65 to 145 mgm. per day. It is suggested therefore that the type of malnutrition of the Bantu, together with their high iron intake, is an important aetiological factor in the haemochromatosis which is common among them. *Dean A. Smith*

Straub, M. & Schaberg, A. **Malnutrition, Hepatitis and Hepatic Cirrhosis.** *Documenta Neerlandica et Indonesica de Morbis Tropicis.* Amsterdam. 1950, Sept., v. 2, No. 3, 238–59, 17 figs. [36 refs.]

Immediately after the Japanese capitulation in Java, many Indonesians were admitted to hospital in a state of extreme cachexia, body weights being as low as 20–25 kgm. Many had oedema, amoebiasis, advanced tuberculosis and other diseases, but malnutrition predominated and cachexia was the immediate cause of death. The microscopical appearances of the liver in 60 cases upon whom post-mortem examinations were made revealed : (1) atrophy of the liver cell cords and liver cells, 29 cases ; (2) atrophy with fatty degeneration, 11 cases ; (3) cirrhotic changes, 3 cases ; (4) inflammatory changes of the infectious hepatitis type, 10 cases ; (5) degenerative changes, acute or subacute yellow atrophy, 7 cases. A combination of two or more of these changes was often observed but one was always found to predominate. Local foci of regeneration were sometimes found in cases of all types.

The histological appearances are described in detail, illustrated by good photomicrographs, and discussed. It is considered that the liver changes in hunger cachexia in Java contain an inflammatory and a degenerative element. Atrophy and fatty degeneration leading to Laënnec cirrhosis are the consequences of malnutrition. The virus infection of hepatitis is probably no different from that encountered in Europe, but its consequences, in livers already damaged by malnutrition, are more serious and it carries a higher mortality, acute yellow atrophy being its severest manifestation.

The authors, however, put forward some evidence, based on the comparison of biopsy material taken just before death with post-mortem sections, that the appearance of acute yellow atrophy in severe cases of hepatitis may be due to post-mortem changes. They demonstrate hydropic degeneration of hepatic cells in severe hepatitis and show that immediately after death the fluid accumulated in the cells rapidly leaves the cells and fills the Disse spaces. Bathed in this fluid, which becomes mixed with bile pigment, the cells undergo rapid autolysis and may soon present the appearance of acute yellow atrophy.

A reasonable explanation of the prevalence of tropical hepatic cirrhosis may be based upon this double aetiology, malnutrition and virus infection, for, while in otherwise normal livers there is recovery of liver structure in non-fatal hepatitis, in malnourished ones there is a tendency to deflect the healing process in the direction of Laënnec cirrhosis. Furthermore, the tendency to nodular regeneration of liver tissue as a consequence of malnutrition is thought to predispose to the development of primary liver-cell carcinoma, reported to be the commonest of all malignant tumours in Indonesians.

Dean A. Smith

VERNON, S. **Nutritional Melalgia, a Deficiency Vascular Disease.** *J. Amer. Med. Ass.* 1950, July 1, v. 143, No. 9, 799–802. [18 refs.]

Although described more than a century ago, the " burning-feet " syndrome has received more attention since many cases were described in the Far East prison camps. The condition is characterized by burning and aching pains in the extremities, with shooting pains up the limbs. Pain is worse at night and prevents sleep. There is often associated evidence of vascular disturbance such as redness or sweating, but no paralysis or wasting, distinguishing the condition from dry beriberi. There is considerable susceptibility to recurrence after apparent cure, brought on by exposure, exertion or other stress. The causative deficiency is believed to be of pantothenic acid and the mechanism of causation is possibly vasospastic disturbance with sympathetic nerve imbalance. Because of the slight objective signs the severity of the condition is likely to be underestimated by clinicians except in the rare circumstances when the disease becomes epidemic. Treatment with calcium pantothenate is usually satisfactory, but as other B complex deficiencies usually co-exist, administration of a good source of the whole complex is usually preferable.

Dean A. Smith

BURCH, Helen B., SALCEDO, J., Jr., CARRASCO, E. O., INTENGAN, Carmen L. & CALDWELL, Anne B. **Nutrition Survey and Tests in Bataan, Philippines.** *J. Nutrition.* 1950, Sept. 11, v. 42, No. 1, 9–29, 3 figs. [17 refs.]

In Bataan beriberi is endemic, and a large-scale experiment in rice enrichment was started in 1948 [this *Bulletin*, 1949, v. 46, 390 ; 1950, v. 47, 73]. As a measure of the initial prevalence of the deficiency a clinical survey was done and a number of biochemical tests were carried out upon a sample of 151 young women who had been graded clinically as having beriberi, either frank, suspected or doubtful. Of these subjects, 54 were pregnant and 54 lactating. Tests were also performed on 25 women and 26 men who had no signs or symptoms of beriberi.

Blood thiamin levels were generally much lower than the average of 6·0 μgm. per 100 ml. found in well-nourished American adults. The average level in the non-symptomatic group was 4·0 μgm. per 100 ml. and there was a progressive fall with increasing severity of symptoms to 3·2 μgm. per 100 ml. in the group with frank beriberi. Thiamin level in red blood cells followed the same trend but differences were small and not significant. The mean urinary thiamin excretion of 20 of the non-symptomatic group was 71·4 μgm. per gm. of creatinine and only one person showed an excretion within the normal range of 150–300 μgm. per gm. of creatinine. Twenty persons with beriberi had an average excretion of 47·3 μgm. per gm. of creatinine. Generally urinary excretion ran parallel to blood level but this was not consistently true in individual cases.

It is evident that in a population in which beriberi is endemic both blood thiamin levels and urinary thiamin excretion may be low in those who show no clinical manifestations and that, in consequence, these measurements have value as an indication of dietary sufficiency.

Haemoglobin levels and haematocrit values indicated a widespread anaemia which was worse in those with beriberi. Total serum protein levels were within the normal range, but towards its lower end. Serum vitamin A levels were normal but the serum levels of vitamin C and carotene were low, reflecting a low intake of fruit and vegetables. Levels of blood thiamin, haemoglobin and serum protein were lower in pregnant than in non-pregnant women though the diet of both groups was apparently the same. This observation demonstrates the importance of a " stress " factor in producing manifestations of deficiency.

Dean A. Smith.

DeMello, E. R., Modi, C. J., Walsh, Margaret P. & Patel, J. C. **A " Nutritional Survey " amongst Factory Workers in Bombay. An Investigation into the Dietetic Habits and the Nutritional Status of 29 Families.** *Indian J. Med. Sci.* 1950, Aug., v. 4, No. 8, 337–60. [13 refs.]

SPRUE

Woodruff, A. W. **Folic Acid and Fat Absorption in the Sprue Syndrome.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1950, Sept., v. 44, No. 2, 223–8. [20 refs.]

Doubts have been expressed as to whether nutritional defects play any part in the aetiology of sprue, and Frazer [this *Bulletin*, 1948, v. 45, 105] thinks that they are secondary features, not primarily related to the impaired fat absorption found in the sprue syndrome. Impaired absorption of fat is a highly characteristic feature of sprue. There have been few studies on the effect of folic acid on fat absorption in sprue. Darby *et al.* [*ibid.*, 461] carried out successive faecal fat estimations on a patient who was given 260 mgm. folic acid in three weeks, during which period the diet was not varied and the fat dropped from 70 gm. to 30 gm. after treatment, while Davidson [*ibid.*, 1947, v. 44, 740] and colleagues found a slight improvement in one patient and little in the other. In three cases of idiopathic steatorrhoea and one of coeliac disease treatment was not accompanied by any significant improvement in fat absorption. It has been shown by Cooke *et al.* [*ibid.*, 1946, v. 43, 946] that the simple estimation of faecal fat is no certain guide to the absorption of fat from the bowel ; but for this a fat balance test is necessary.

In a study of seven cases of non-tropical sprue, Ferguson & Calder [*ibid.*, 1949, v. 46, 77] found no evident improvement in fat absorption as estimated by balance tests. Though all observers are agreed that folic acid improves the clinical condition of patients with tropical sprue, its effect on fat absorption has been less clearly demonstrated.

Of five patients admitted to the Hospital for Tropical Diseases, London, four had active tropical, and one non-tropical sprue. They were placed on a diet containing 75 gm. fat daily, rich in protein, and low in carbohydrate. This diet was continued throughout the periods of preliminary observation and treatment and during the balance tests. A fat balance was carried out after a preliminary period of observation of 10 days. This was followed by a period of folic acid therapy lasting 12 days and a further fat balance test.

In each of the four cases of tropical sprue the period of treatment with folic acid was marked by an improvement in appetite, diarrhoea and well-being. There appears to be little doubt from this work and the observations of other workers that folic acid improves the appetite, diarrhoea and general condition of patients with tropical sprue. In the series of cases under consideration, this improvement occurred without a coincident significant improvement in fat absorption, but in appraising these figures, it should be remembered that COOKE *et al.* [this *Bulletin*, 1946, v. 43, 946] have shown that the method of estimating the fat in the diet has an error of ±4 per cent. This apparent failure of folic acid to improve fat absorption in tropical sprue, in spite of its action in controlling many other manifestations, suggests that, if tropical sprue is a nutritional disease, several factors are missing. This may explain the therapeutic efficiency of crude yeast preparations such as Marmite, and the inefficiency of pure vitamins under these conditions. See also FRAZER, this *Bulletin*, 1950, v. 47, 74 ; FOX, *ibid.*, 74.] *P. Manson-Bahr*

HAEMATOLOGY

BEET, E. A. **Observations on Haemoglobin Values in African Children.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1949, Nov., v. 43, No. 3, 317–28. [15 refs.]

The haemoglobin values of the blood of "normal" school children of the Lala, a Bantu tribe who live in the Serenje and Mkushi districts of the Central Provinces of Northern Rhodesia, were estimated. A Sahli haemoglobinometer was used and the reading was taken after five minutes ; all observations were made by one observer.

The mean of the whole group of 630 children was 12·3±1·3 (males 12·4 : females 12·2) gm. per 100 ml. The author quotes figures showing that this figure is lower than that of European children and Southern Rhodesian—both European and coloured—children [this *Bulletin*, 1942, v. 39, 883], but is the same as that of Gold Coast African children [*ibid.*, 1948, v. 45, 810].

The effect of the age of the child is shown ; height is taken as the criterion in view of the difficulty in accurate determination of age in African children. The author shows that there is an orderly progression from 11·6 gm. at 48 inches and below to 13·7 gm. at 63 inches and above.

The possible causes of the revealed "anaemia" are discussed. There was no difference between the mean haemoglobin values of the 299 (47 per cent.) children with hookworm infection—a single stool examination being the criterion—and those without.

The mean haemoglobin of children with urinary schistosomiasis is 11·6 gm. compared with 12·5 gm. of those without : the difference is significant and other factors can be excluded.

There is no significant difference between the children who show malaria parasites and those showing none, on a single thick film examination. On the other hand, there is a significant difference (six times the standard error of the difference) between those with (11·8 gm.) and without (12·5 gm.) palpable spleens. The significance of this observation is largely nullified by the fact that splenic enlargement is far more frequent in the lower age groups.

Of 616 children tested for the trait, 81 showed sicklaemia ; the mean haemoglobin level in these was 12·5 gm., that is higher than the mean of the whole group.

Generally speaking, the Lala diet is deficient, not in iron but in ascorbic acid and extrinsic factor ; this is thought to be another cause of the low haemoglobin.

The author suggests that the greater degree of " anaemia " in the lower age groups is due to the lesser degree of immunity to malaria of younger children. [Surely the lower haemoglobin level in the younger age groups is a constant observation in any population?] *L. E. Napier*

Foy, H., Kondi, Athena, Hargreaves, A. & Lowry, J. **Anaemias of Africans in Kenya.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1950, May, v. 43, No. 6, 635–48, 7 charts. [40 refs.]

Nutritional macrocytic anaemia, of India and Macedonia, is a very definite entity, and, despite the fact that many reports of macrocytic anaemia in Africans have appeared, the authors state that evidence is lacking that any cases reported were in fact true megaloblastic anaemia.

Their criteria for the diagnosis of this condition are :—

(1) A mean corpuscular volume above 95 μ^3 when the reticulocyte count is below one per cent.

(2) A high colour index.

(3) The presence of Ehrlich's megaloblasts or giant " stab " cells or both in the marrow, and hypersegmented neutrophils in the blood.

(4) Free HCl in the gastric juice.

(5) A shift to the right in the Price-Jones curve.

(6) Response to potent liver extract, to Marmite, to pteroylglutamic acid, or to vitamin B_{12}, care being taken to exclude the natural blood picture response after parturition.

They add that sickle-cell anaemia should be excluded and that a series of five to ten days' observation before treatment is necessary.

The authors state that " during the last two months we have had an opportunity of critically examining all the cases of anaemia that occur among Africans entering the Nairobi Group Hospital and from some of the outlying hospitals, and we are able to confirm that megaloblastic anaemias do occur among Africans that have not a macrocytic blood picture, and which respond to either crude or refined liver, to Marmite or to pteroylglutamic acid ".

They state that they have been able to identify four groups of cases :—

(1) Microcytic hypochromic, without megaloblasts, with a Price-Jones curve to the left, and responding to iron.

(2) Normocytic normochromia, with megaloblasts, giant " stab " cells in the marrow and hypersegmented neutrophils in the peripheral blood, normal Price-Jones curve, and responding to liver extract, but also requiring iron.

(3) Similar to last group but the anaemia is less extreme ; megaloblasts are not present in the marrow but giant " stab " cells are ; and iron is not usually necessary.

(4) Characteristic macrocytic megaloblastic picture, with Price-Jones curve shifted to the right, showing a response to crude or refined liver extract without iron, and with nerve involvement or glossitis.

In all four groups there is free HCl in the stomach.

A discussion on the aetiology of these anaemias follows ; this is too detailed to be summarized. However, among other things it is concluded that only group (1) can be due solely to the loss of blood associated with parasitic infections, but that, since parasites are present in all the cases, these infections may possibly interfere with synthesis, absorption or utilization of haemopoietic factors, or there may be a direct nutritional deficiency. *L. E. Napier*

EPIDEMIC DROPSY

CHAKRAVARTI, R. N., CHAUDHURI, R. N. & CHAKRAVARTY, N. K. **Epidemic Dropsy. A New Test for Argemone Oil.** *Indian Med. Gaz.* 1950, Aug., v. 85, No. 8, 344–5. [12 refs.]

The authors refer briefly to the methods of detecting argemone oil in mustard oil and discuss the disadvantages of the three existing chemical tests, namely the nitric acid, cupric acetate and ferric chloride tests. They therefore set out to develop a test that would be simple, sensitive and practicable in the least equipped laboratory.

The test devised satisfied these conditions and furthermore it needs only a small amount of the suspected oil and depends on a colour reaction which may be used for quantitative estimates.

The reagent consists of 2 volumes of concentrated HCl (S.G. 1150 to 1155) diluted with 1 volume of distilled water, *i.e.*, about 20 per cent. HCl w/w. The sample of mustard oil is filtered and 2 cc. are mixed with an equal volume of ether in a test tube ; then 0·3 cc. of the reagent is added, the tube is well plugged with cotton wool and kept for 16 hours. The presence of argemone oil is indicated by the appearance of an orange colour of the lower acid layer. This colour can be discharged with a few drops of concentrated NaOH or liquor ammoniae and reappears if a few drops of concentrated HCl are added. It can also be discharged by the addition of a small piece of zinc.

Where adulteration is fairly high, orange needle-shaped crystals may separate out at the acid-oil interface.

The authors claim that the test is extremely sensitive and has been found positive in a concentration of 0·1 per cent. The dilution with ether is not essential, but appears to aid development of the colour.

The test is being investigated further regarding the effects of time, temperature and the use of other reagents, the development of colorimetric estimation of argemone oil in mustard oil, and the effects on the test of adulteration with other oils. *H. J. O'D. Burke-Gaffney*

VENOMS AND ANTIVENENES

CORKILL, N. L. **Sudan Thanatophidia.** Reprinted from *Sudan Notes & Records.* 1949, v. 30, Pt. 1, 6 pp., 2 figs.

The author's experience of 16 years in the Sudan medical service and close interest in herpetology have led him to differ from the view of ARKELL who in 1947 reported that most fatal cases of snake-bite in the Sudan were due to *Atractaspis microlepidota*, the black burrowing viper of the Sudan. Dr. Corkill found that *Echis carinatus*, the carpet viper, held first place. Though *Naja haje*, the African cobra, *N. nigricollis*, the black-necked spitting cobra and *N. melanoleuca*, the black and white cobra are common, recorded instances of bites by them in the Sudan are rare. In the Nuba area *Dendraspis augusticeps*, the black mamba, is feared, for its bite is often fatal. The author gives a table analysing 330 cases of snake-bite and 4 where poisoning occurred from a spitting snake, two of them *N. nigricollis*. In only 52 cases of snake-bite was the snake identified ; in 19 it was *Echis carinatus* (in 7 others it was believed to be the cause) ; in 10 *Atractaspis microlepidota* (in one other it was thought to be incriminated), in 3 *Causas rhombeatus*, in 4 *B. lineatus*, the lined house-snake, two each of the hissing snake, *P. sibilans*, green night adder, *C. resimus*, and the puff adder, *B. arietans* ; *N. haje* and *N. nigricollis* one each. It is said

that some 20 per cent. of the bites by *Echis carinatus* are fatal and that was the author's experience; the two fatalities among the ten bitten by *A. microlepidota* would give the same ratio.

A list of 16 poisonous snakes catalogued from the Sudan is given and contains 1 opisthoglyph colubrid, 7 Elapidae (of which *Elapechis laticinctus* was not seen during the period 1933–1946 among 1,833 specimens) and 8 Viperidae.

H. Harold Scott

PHILPOT, V. B. & SMITH, R. G. **Neutralization of Pit Viper Venom by King Snake Serum.** *Proc. Soc. Exper. Biol. & Med.* 1950, July, v. 74, No. 3, 521–3. [Refs. in footnotes.]

There is a widespread belief that the king snake, *Lampropeltis getulus*, is immune to the bites of American vipers. The authors obtained serum from the king snake, detoxified it by heating to 56°C. for 30 minutes and tested its action on the venoms of the Florida rattlesnake, *Crotalus adamanteus*, and water moccasin, *Ancistrodon piscivorus*, in mice and compared it with Wyeth's polyvalent antivenin. The details are presented in protocols and described in the letterpress and they showed that the king snake serum does to a considerable extent neutralize the venoms of the other two and that the king snake itself could naturally withstand very high doses of their venoms intramuscularly injected—as much as 1,035 mgm. of venom in one case in 5 doses in 21 days, one single injection being of 320 mgm., much greater, that is, than is lethal to man. The protection of mice seemed to hold good whether the serum and venom were introduced separately or were mixed *in vitro* first. Wyeth's polyvalent antivenin showed a definitely lower degree of neutralizing power against moccasin and rattlesnake venoms. More investigations will be needed to determine any possible therapeutic value of the *Lampropeltis* serum.

H. Harold Scott

JÁNSZKY, B. **The Relation between the Proteolytic and Blood Clotting Activity of Snake Venoms.** [Correspondence.] *Arch. Biochemistry.* 1950, Aug., v. 28, No. 1, 139–40.

GÖREN, S. Akrepler ve akrep serumu. [**Scorpions in Turkey and Antiscorpion Serum.**] *Türk Ijiyen ve Tecrübî Biyoloji Dergisi.* Ankara. 1950, v. 10, No. 1, 81–93. French summary 93–5.

Five species of scorpions are recorded from Turkey:

(1) *Buthus gibbosus*—frequent in central Anatolia.
(2) *Prionurus crassicauda*, widely distributed in the south-east. It resembles *Androctonus australis* of North Africa.
(3) *Maurus fuscus*, especially frequent at Dörtyol, Elazik, Seyhan, Osmaniye, Kozan and Islâhiye. It resembles *Scorpio maurus* of North Africa.
(4) *Euscorpio italicus* is met with at Kocaeli, Corlu, Kargi, Ordu, Giresum, Trabzon and Rizé,
(5) *Euscorpio carpaticus*. This has only been met with once.

No. (2) above is stated to be the most poisonous. The author has prepared a protective serum in horses with the venom of the most toxic of the local scorpions. For the last year, they have been using a dried product prepared from desiccated telsons. The minimal lethal dose of this dried product is 0·001 gm. for a mouse of 20 gm.

The serum is prepared with active venom, at a dose of 0·02 gm., rising to 0·6 gm. injected subcutaneously at weekly intervals. For injection, the dried product is crushed finely in a mortar and sterile saline (0·9 per cent.) is added.

The serum is tested in rats weighing 150 grammes, which are injected subcutaneously with mixtures of different amounts of serum and a lethal dose of venom which have been in contact at 37°C. for an hour. If the serum is protective in a quantity of 0·3 or 0·5 cc. it is regarded as satisfactory.

H. J. O'D. Burke-Gaffney

Bonsib, R. S. **Black Widow Spider Bites ; their Physiological Effects, Treatment and Prevention.** *Med. Bull.* New Jersey. 1949, May, v. 9, No. 1, 5–12, 1 fig.

This is a good summary of the effects of bites by the Black Widow spider, *Latrodectus mactans*, but does not contain anything not already within the knowledge of readers of the *Bulletin*. Cases have been reported from 32 States in America and fatalities in 17 of these States. A brief account is given of the life-history of the spider, its habits and habitats. It lives for about a year and produces up to 600 young in one egg-sac. Drop for drop the venom " is far more deadly than that of the diamond-back rattlesnake " and is a powerful neurotoxin. The bite may not at first be felt but, soon after, the characteristic symptoms develop. [These are fully described in this *Bulletin*, 1936, v. 33, 401.] The abdominal symptoms may be so acute that perforation of a peptic ulcer is suspected.

Local treatment is of little use because the venom is disseminated too rapidly. Specific antivenins are the only satisfactory treatment, 2·5 cc. (the contents of one ampoule) injected intramuscularly. Temporary relief may be obtained by codeine or morphine, or by calcium gluconate, 10 cc. of a 10 per cent. solution intravenously, or magnesium sulphate by the same route or intramuscularly, 20 cc. of a 20–25 per cent. solution. Neostigmine methyl sulphate has been recommended. Places where the spiders lurk should be sprayed with creosote or other insecticide.

H. Harold Scott

Harant, H. & Huttel, W. Un insecte vulnérant peu connu. [**A Little Known Stinging Insect.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 7/8, 449–50.

The authors in Montpellier describe a case of stinging by a small wasp which they identified as *Scleroderma domestica*. They refer to the previous observations of Mandoul *et al.* [this *Bulletin*, 1950, v. 47, 896] who described three cases of reactions to stings of *Scleroderma abdominalis* in Algiers. The present authors point out that the species present in Southern France is thus also capable of inflicting traumatizing stings on human beings.

H. J. O'D. Burke-Gaffney

Stammers, F. M. G. **Observations on the Behaviour of Land-Leeches (Genus *Haemadipsa*).** *Parasitology.* 1950, Oct., v. 40, Nos. 3/4, 237–46, 1 fig. [16 refs.]

After quoting the comments on land leeches made by several travellers, the author describes the effects of leech bites, the value of various repellents, and gives an account of the behaviour of a land leech *Haemadipsa zeylanica*.

Severe secondary infection may result from leech bites, and in any case prolonged bleeding occurs. Blood taken from the attachment wound, after the removal of the leech, takes four times as long as normal blood to clot ; the clotting time becomes normal after about ten minutes. After having passed through the pharynx, however, the blood is virtually incoagulable.

Over seventy substances were tested for repellency to leeches in the laboratory. Dimethyl phthalate is recommended as a repellent and four

preparations containing it are given. The best of these is said to be dimethyl phthalate 25, white wax 18, arachis oil 57.

It seems likely that land leeches find their hosts as a response to chemical sign stimuli and those of humidity and temperature. Attachment seems to be evoked by contact with an object at a temperature higher than that of the air, or by the smell of mammals, or by both acting together. Locomotion is inhibited by bright light and restored by decreases in light intensity.

J. H. Sudd

Rocha e Silva, M. Autofarmacologia e venenos animais. [**Auto-Pharmacology and Animal Venoms.**] *Arquivos Inst. Biologico.* São Paulo. 1949–50, v. 19, 1–22, 10 figs. [39 refs.] English summary.

DERMATOLOGY AND FUNGUS DISEASES

Lamb, J. H., Shelmire, B., Cooper, Zola, Morgan, R. J. & Keaty, Corinne. **Solar Dermatitis.** *Arch. Dermat. & Syph.* 1950, July, v. 62, No. 1, 1–26, 10 figs. [Refs. in footnotes.]

Solar dermatitis may be defined as an acute or chronic inflammatory reaction of the skin to sunlight. Since 1940, the authors have seen 145 patients with solar dermatitis in two south-western centres in the United States, Oklahoma City and Dallas. The following different types of polymorphic light-sensitive eruptions were recognized as the result of a detailed study of 34 cases at the Oklahoma School of Medicine.

The plaque-like type.—Approximately 75 per cent. of the patients with solar dermatitis presented plaque-like lesions. These varied in size from 2 to 5 cm. in diameter and were usually situated on the cheeks or the neck.

The contact eczematous type which was diffuse or localized, the skin being erythematous, pruritic, thickened and excoriated. Oedema and vesiculation followed prolonged exposure to the sun. Four of the 34 patients observed belonged to this type.

The papular and prurigo-like type.—In only one case did papular prurigo-like lesions predominate, although pruriginous lesions were seen in most of the other types.

Erythematous type.—Lesions like erythema multiforme occurred in 10 patients. They were persistent, unlike true urticaria solare. The early lesions were confined to the cheeks, neck and forehead and were from 1·5 cm. to 3 or 4 cm. in diameter. The name "erythema solare perstans" is given to this type.

Histological examination of light-sensitive eruptions showed non-specific inflammatory changes, consisting of oedema in both the epidermis and the dermis and a cellular infiltrate about dilated vessels in the corium.

Patch tests to a wide variety of commonly encountered weeds and other extracts of vegetables, fruits and grains were all negative, a finding which would appear to rule out the possibility of photosensitivity resulting from allergy to foods or weeds in these cases. No case of porphyrinuria was found in this series.

Urinary creatine and 17-ketosteroid excretion were estimated in the cases of 31 men and 3 women. Where creatinuria and depressed 17-ketosteroid excretion was found, amelioration followed administration of testosterone propionate, or stimulation of androgen production in men by the administration of equine gonadotropins.

H. T. H. Wilson

GUILLOT, C. F. Historia de las dermatosis Africanas en el Nuevo Mundo. [**History of African Dermatoses in the New World.**] 103 pp., 13 figs. [121 refs.]. 1950. Buenos Aires : El Ateneo.

In this small book of six chapters the author has imparted a vast amount of information and the gathering of the facts must have entailed much delving into past literature and medical history, and the list of references at the end of each chapter bears ample witness to the wide reading and literary research which the author has undertaken.

As the title indicates this work does not attempt to describe the *clinical aspects* of African dermatoses, except in so far as this is necessary to elucidate the condition in question ; he deals solely with the *history* of them. The work is a study of one branch—cutaneous diseases—of what the author has termed "pathological osmosis", by which he implies the gradual interpenetration of diseases between an indigenous population and an imported race, between the inhabitants of the New World and Africans brought in through the slave trade. Accordingly, he groups the various cutaneous disorders into four categories :

1. Those introduced into America by imported slaves, such as filariasis, alastrim, and those which seem to occur in the black races only, ainhum for example and certain dyschromias and keloids.

2. American autochthonous conditions affecting the negroes, as pinta, chiggers, muco-cutaneous leishmaniasis.

3. Cosmopolitan, infections common in both white and black races, as leprosy, syphilis, smallpox, yaws.

4. Slave-trade diseases resulting from the overcrowding, malnutrition, etc., such as ulcers, scurvy, beriberi, ophthalmia, tuberculosis.

The first group is considered in the succeeding chapter, in particular the helminthiases, filariasis, onchocerciasis and ankylostomiasis ; also alastrim, ainhum, dyschromias and gangrenous rectitis. There is an excellent illustration of an albino negro, the so-called "Negro pio" or piebald negro, and of keloid scars arranged as an ornamental pattern on the front of the thorax and on the face. In the fourth chapter the second group is discussed—pinta and vitiligo dyschromias and chigger ; in the fifth the venereal diseases, leprosy and the problem of yaws, whether it was of African origin or not, the complications of goundou and gangosa and the differences between yaws and syphilis. The question of the introduction of leprosy into America justly takes account of the European nations, Spain and Portugal, as well as African, as the sources whence the disease was brought to the New World. In the concluding chapter the fourth group is considered, as stated above, as well as some of the wanton, sadistic cruelties inflicted on slaves, though hardly coming within the ambit of diseases.

From the viewpoint of the medical historian this is a valuable work, for it will save much searching into ancient literature and as each chapter ends with a fairly full list of works of reference on the subjects dealt with, the way is made easy for any who wish to go more deeply into the matters written about. It is worthy of being translated into other languages. *H. Harold Scott*

QUINLAND, W. S. & CHENAULT, J. W. **Mycetoma Pedis : Madura Foot. Report of a Case.** *Southern Med. J.* 1950, Oct., v. 43, No. 10, 851–5, 5 figs. [17 refs.]

A case in a Negro in Alabama.

Niño, F. L. Hallazgo de una pieza anatómica. Su importancia en la historia de la psorospermiosis o granulada coccidioidico. [**Discovery of an Anatomical Specimen of Importance in the History of Psorospermiosis or Coccidioidal Granuloma.**] *Bol. Inst. Clin. Quirúrg.* Buenos Aires. 1950, Jan.–Mar., v. 26, No. 188, 3–14, 23 figs. on 3 pls. & 2 text figs. English summary.

On 3rd November 1948, the author, when reviewing a collection of pathological specimens preserved in the Museum of the Department of Parasitology of the University of Buenos Aires, identified an undescribed human head as that of the man who was the first known subject of coccidioidomycosis. Posadas discovered the disease, to which he gave the name Psorospermiosis, in this patient in 1892 and he studied its progress up to the time of the man's death in July 1898. After autopsy, the gross specimens were preserved and forgotten until rediscovered after the lapse of 50 years. The identification of the head was based on photographs of the patient left by Posadas, and confirmation was furnished by the histological examination of the tissues which were in a good state of preservation and showed the histopathology of coccidioidal granuloma and the developmental stages of the parasite. In 1947 two other specimens, a hand and a foot, belonging to the same patient had been found. *J. T. Duncan*

Smith, C. E., Saito, Margaret T., Beard, R. R., Kepp, Ruth McF., Clark, Ruth W. & Eddie, Bernice U. **Serological Tests in the Diagnosis and Prognosis of Coccidioidomycosis.** *Amer. J. Hyg.* 1950, July, v. 52, No. 1, 1–21, 3 figs. [32 refs.]

In the uncomplicated primary stage of coccidioidomycosis, diagnosis by microscopy or culture is often difficult or impossible and serology may provide the only satisfactory basis. The coccidioidin skin test is not conclusive unless its results show conversion from negative to positive, but it is useful to " screen " cases for serological tests.

The serological tests used are the complement-fixation test (C.F.T.), and the precipitin test, and for these the antigen employed is a soluble autolysate of the fungal growth on a special synthetic medium described by Smith *et al.* [this *Bulletin*, 1948, v. 45, 929]. The preparation and selection of antigen for the C.F.T. demands great care, for great variation not only in antigenic potency but also in anticomplementary properties may be found in samples prepared under identical conditions. No means has yet been found of concentrating the antigen without similarly increasing its anticomplementary properties. When stored in a sterile condition at room temperature or in the cold, the C.F.T. antigen preserves its potency for years, but it is destroyed by high temperatures and cannot withstand sterilization in the autoclave. In this respect it differs from the antigenic elements for the precipitin test which are present in the same preparation.

The C.F.T. is performed according to the technique of Kolmer. The inactivated human serum is set out in serial dilutions in 0·25 ml. quantities, and 0·25 ml. of the antigen solution is added to each tube, followed by two doses (0·5 ml.) of complement. For fixation, the tubes are incubated in the water bath at 37°C. for 2 hours. Then the haemolytic system is added and the first reading taken after a further hour's incubation at 37°C. The final reading is made after storage in the cold overnight and the end-point titre of the serum is taken as the highest in which there is total absence of haemolysis. In the time and temperature employed for fixation of the complement, this test differs from those used by Saslaw and Campbell [this *Bulletin*, 1949, v. 46, 83]

and SALVIN [this *Bulletin*, 1948, v. 45, 731]. In view of the unsuitability of laked or contaminated blood, it is required that samples of serum for the C.F.T. should be separated and preserved with 1 part to 9 of 1 : 1,000 merthiolate before transmission to the laboratory.

For the precipitin test, antigens may be used which, because of their anti-complementary properties, would be unsuitable for the C.F.T. They may be concentrated by dialysis and sterilized by heat. The precipitin test is not carried out by determination of optimal ratios but by reading the precipitation end-point in serial antigen dilutions with a constant serum dose ; usually undiluted serum. Test tubes of 7 mm. diameter are used and precipitation is shown by a button or flake deposited at the bottom of the tube. The test is incubated at 37°C. for 5 days and readings are recorded daily. To prevent the growth of bacterial contaminants during the prolonged incubation it is necessary to add merthiolate to the reagents so as to give a concentration of 1 : 10,000 in the reacting mixtures.

The authors have performed the C.F.T. and the precipitin test together on 31,000 sera during the ten years 1940 to 1950, and the results of this immense experiment have demonstrated the specific character of these reactions. Sera from a number of different bacterial and virus infections have given uniformly negative results with the *Coccidioides* antigen, but occasional cross reactions may be expected with sera from other deep mycoses.

Sera from 3,219 cases of the primary, non-disseminated stage of the disease gave positive results with the precipitin tests in 78·4 per cent. and with the C.F.T. in 55·6 per cent. In sera from 419 cases of the disseminated stage of the disease the order was reversed and precipitin results were positive in only 38·6 per cent. while the C.F.T. positives rose to 97·6 per cent.

Precipitins appear in the serum at an earlier stage of the disease than the complement-fixing antibodies and, in the clinically manifested disease, they were demonstrable in 50 per cent. of the sera during the first week, rising to 90 per cent. in the third week and, thereafter, falling progressively until none were demonstrable after the seventh month. The complement-fixing antibodies were found in only 8 per cent. of sera in the first week but the proportion of positives continued to increase for three months, although reversions from positive to negative began to appear at the end of the second month. These antibodies, however, persisted in some cases for more than a year.

The precipitin test finds its greatest use in the earliest stage of the disease and the C.F.T. at a later stage. In prognosis the C.F.T. has a special value for its titre increases with the severity of the disease. In the simple primary stage of the disease, serological tests never gave a positive result in the absence of dermal sensitivity to coccidioidin, so the coccidioidin test provides a means of screening patients for serological tests. Of course, dermal sensitivity persists long after the humoral antibodies have disappeared.

Specific antibodies were demonstrated in the pleural, ascitic and cerebrospinal fluids of patients, and on four occasions they were found in the blood of newborn infants. *J. T. Duncan*

NIÑO, F. L., RISOLÍA, A. & FERRADA URZÚA, L. Nueva observación de coccidioidomicosis en la República Argentina. [**New Observation of Coccidioidomycosis in the Argentine Republic.**] *Bol. Inst. Clin. Quirúrg.* Buenos Aires. 1950, Jan.–Mar., v. 26, No. 188, 71–80, 19 figs. [13 refs.]

This was the twelfth case of coccidioidal disease to be recorded in Argentina. The patient, a female nurse aged 36, suffered from deep-seated disease of the right foot, for which a radiological examination was made. This disclosed marked decalcification of the bones of the tarsus and osteitis of the scaphoid.

The condition was diagnosed as tuberculous but, despite treatment, it progressed. Two years after the first examination an exploratory operation was performed and some purulent matter collected. Microscopical examination of this material did not reveal the tubercle bacillus or any fungus. The coccidioidin skin test gave a negative result.

The purulent material was inoculated into the peritoneum of a guineapig and also sown on slopes of glucose agar. From the animal and from the cultures *Coccidioides immitis* was isolated.

Treatment consisted of rest, iodotherapy, deep X-ray, intensive vitamin therapy, calcium therapy and administration of 5 per cent. solution of gentian violet in doses of 5 mgm. per kgm. of body weight daily for 4 to 6 days. No other details of dosage or the result of treatment are stated. *J. T. Duncan*

TROPICAL OPHTHALMOLOGY

Sidky, M. M. & Freyche, M. J. **World Distribution and Prevalence of Trachoma in Recent Years.** *Epidemiological & Vital Statistics Rep. W.H.O.* 1949, Nov.–Dec., v. 2, Nos. 11/12, 230–77, 2 maps & 1 graph. [Bibliography.] [In parallel French & English.]

A report on the world distribution and prevalence of trachoma in recent years under the auspices of the World Health Organization has been compiled by Sidky and Freyche. The last comprehensive study of trachoma was made in 1935 and is thus more than fourteen years old. The present report is based on a joint OIHP/WHO Study Group which met in Paris in October 1948. The summary of their conclusions points out that trachoma is present in practically every country of the world ; that it shows a high endemicity in several countries of Asia and in North Africa ; it is also endemic in countries of Eastern Europe and in several of the American Republics. It is practically non-existent in Australasia. The Study Group recommended that the W.H.O. obtain from Governments up-to-date information on the prevalence of trachoma throughout the world, based on returns established after examination of school children, army recruits and samples of populations, and on percentage of trachoma cases to the total number of eye patients treated in ophthalmic hospitals and clinics. It suggested that such a survey be repeated every ten years.

A circular letter was sent to all Governments in February 1949 and so far about forty replies have been received. The information thus collected constitutes the only actually original part of the report. In the survey the various countries are arranged according to continent and classified in the alphabetical order of their French names.

For those who are interested in trachoma, the report should be read in full.

E. O'G. Kirwan

Elliott, D. C. **A Further Report of Polypoid Leprous Lesions of the Fundus. Observations of Six Cases.** *Internat. J. Leprosy.* New Orleans. 1949, July–Sept., v. 17, No. 3, 229–36, 5 figs. on pl.

Distinctive changes in the fundus of the eye believed to be due to leprosy, seen in a single case, have been described in a previous report by the author [this *Bulletin*, 1949, v. 46, 669]. Since then five other patients with similar lesions have been observed.

Four of these six cases were classified as lepromatous, one as "mixed" type and the remaining case as tuberculoid type. The retinal lesions are leprous nodules or polyps and are similar to the pearl-like nodules so often observed on the iris. They are of a faintly yellowish-grey colour and they seem to have a waxy surface. They are usually discrete and in only one case did they fuse to form a conglomerate mass.

The author forms the opinion that leprous lesions occur in the fundus oculi in certain cases, and any case may pass through a phase when these distinctive pearl-like nodules can be clearly seen. Owing to the changes that are so commonly found in the anterior portion of the eye, observations of fundus changes in leprosy have been so far rarely reported in the literature.

Full clinical details of all six cases are given and two cases are illustrated with five retinal photographs. *E. O'G. Kirwan*

HEAT STROKE AND ALLIED CONDITIONS

CULLUMBINE, H. **Heat Production and Energy Requirements of Tropical People.** *J. Applied Physiol.* 1950, June v. 2, No. 12, 640–53. 29 refs.

Observations of the basal heat production were made on 225 Ceylonese subjects, male and female, and of various ages. The rates of heat production were more closely related to a function of the body weight (0·79 power of the weight) than to the estimated body surface area. On the assumption that the 0·79 power of the body weight represents the "metabolically active weight" of the subject it is shown that the heat production per unit of metabolically active weight is greater for well-proportioned people than for the lean.

From measurements made on Ceylonese boys during play it appears that the energy produced, in excess of the basal level, during play is proportional to the body weight.

Caloric requirements of Ceylonese have been computed from these data, and the estimates have been found to correspond closely with the calorie intakes estimated from measurements of food consumption. The estimated requirements are lower than the calorie values which have previously been suggested as desirable. For the average adult male and female, respectively, the suggested values are 2,020 calories and 1,740 calories, for children of 14 years of age the figures are 1,660 and 1,672 for males and females respectively, and for those aged 10 years 1,290 and 1,240 calories. *Thomas Bedford*

GALVÃO, P. E. **Human Heat Production in relation to Body Weight and Body Surface. III. Inapplicability of Surface Law on Fat Men of the Tropical Zone. IV. General Interpretation of Climatic Influence on Metabolism.** *J. Applied Physiol.* 1950, July, v. 3, No. 1, 21–8, 4 figs. 18 refs.

Earlier work by the author led to the conclusion that minimal heat production is proportional not to the surface area of the body but to a function of weight only (the 0·83 power of the body weight for lean men, and the 0·78 power for well-proportioned men) this *Bulletin*, 1949, v. 46, 497. This function of the weight is believed to represent the metabolically-active weight of the subjects.

The present paper reports the results on fat men, living under the same climatic conditions as those to which the earlier subjects were exposed. There were fifty subjects, white Brazilian men, aged 20 to 45 years, with weights of 62 to 99 kgm. All followed sedentary occupations and all were in perfect health. For these men the function of weight which best fitted the metabolism data was the 0·71 power.

When the basal metabolism in calories per hour is divided by the appropriate function of the weight ($W^{0.83}$, $W^{0.78}$ and $W^{0.71}$ for lean, well-proportioned and fat men respectively) the quotient for fat men is 55 and 35 per cent. higher than that for the lean and the well proportioned men respectively. This increase in the ratio is explained as a consequence of the greater activity of metabolic tissue needed to support and transport a larger weight of inactive tissue.

The Brazilian data are compared with published figures for American subjects. The American data show heat production to be proportional to body surface. When the American data are examined on the basis of body weight the exponents of the weight are almost identical for lean, fat and well proportioned men. It is assumed that this difference from the Brazilian results is due to the effects of the cooler climate, in that in the cooler climate greater heat loss, proportional to the body surface area, has to be made up.

Thomas Bedford

MACPHERSON, R. K. **Tropical Fatigue. Being an Account of a Preliminary Enquiry, conducted in the Field, into the Effects of Service in the Netherlands East Indies, New Guinea, and the Solomon Islands on R.A.A.F. Ground Crew, R.N.Z.A.F. Ground Crew, and A.I.F. Soldiers.** *Univ. of Queensland Papers. Dept. of Physiol.* 1949, Nov. 24, v. 1, No. 10, 162 pp., 7 figs. & 1 map. [212 refs.]

During the war, Australian physiologists were greatly interested in the effects of tropical climates on Service personnel, and they studied problems such as acclimatization and the loss of weight in troops operating in the tropics. It was widely said that there occurred a deterioration in troops serving in tropical climates, and it became apparent that investigations must be undertaken to ascertain whether in fact such deterioration did occur, and, if so, to study its incidence and its nature. Such an inquiry was undertaken by physiologists, with the cooperation of the Services. A full account of the survey is given in this report.

Meteorological observations were made. Physiological observations included the assessment of circulatory responses to postural change, and of the performance of the Harvard Pack Test and of a marching test. Any remark that any subject thought fit to make concerning his health, efficiency or happiness was noted, and general observations were made by the author on the behaviour of the men under widely varying conditions, of stress of work, living conditions, climate, and types of duty.

The belief in the existence of deterioration through tropical fatigue was held by all ranks, including medical officers. Disabilities alleged to have been incurred from this cause included loss of weight, loss of energy and feeling of tiredness, inability to perform the usual amount of work, increased ill-health (especially "skin trouble"), general malaise, dizziness on standing, loss of appetite loss of memory, loss of initiative, a slowing of mental processes and irritability.

No progressive loss of weight was found, except in those who started with a high initial weight. There was a small but significant correlation between length of service in the tropics and performance of the Harvard Pack Test.

The author, from his enquiries, reached the conclusion that tropical deterioration occurred, but the only evidence of physical deterioration was the slow decline in performance of the pack test. He was forced to the conclusion

that the physical deterioration found could not account for the loss of efficiency complained of, and that a large part of the deterioration must be of psychological origin.

In the production of this psychological deterioration other factors besides temperature and humidity were involved. They included isolation, boredom, conditions of service, and the moral fibre of the men themselves. Yet it is not suggested that climate played a minor part. A tropical climate is trying, and one is continually conscious of it. Such a climate, it is said, is aggressive, and must be met aggressively. This many fail to do, and they suffer from tropical fatigue. On this point the author quotes a most apt passage from Prescott's "Conquest of Mexico".

The burden imposed by the climate can be lightened by suitable housing and by suitable clothing. Further research is needed in the pathology and treatment of skin diseases. The use of machinery and labour-saving devices must be exploited so as to reduce the load of physical effort. People who go to live in the tropics must regard the tropics as their home, and not count the days until the tour of duty is over. Above all, there is no place in the tropics for the poor in spirit. There must be adequate education, and a worth-while task to provide incentive to activity.

This valuable report is provided with an excellent bibliography.

Thomas Bedford

ROBINSON, S., GERKING, S. D., TURRELL, E. S. & KINCAID, R. K. **Effect of Skin Temperature on Salt Concentration of Sweat.** *J. Applied Physiol.* 1950, June, v. 2, No. 12, 654–62, 3 figs. [13 refs.]

Wide variations in the chloride concentration in sweat have been observed, with low values in persons acclimatized to heat. Some earlier observations gave evidence that the lowering of sweat-chloride during the days of acclimatization to heat may be due to the reduction of skin and rectal temperatures as temperature regulation improves. The study here reported was planned to investigate the direct effect of temperature of the sweat glands on the salt concentration of the sweat being secreted. The subjects were young men in good physical condition. Four of them were studied in varying degrees of acclimatization to heat. They worked in a hot environment, and sweat for analysis was collected from the men's hands and forearms in elbow-length rubber gloves. Hand temperatures were maintained at any desired level between 20° and 35°C., or above 37°C. During exposures the men kept their weights constant by drinking measured quantities of water at frequent intervals.

When the two hands and forearms of a subject were simultaneously kept at different temperatures, the sodium and chloride concentration of sweat collected from the cooler hand was significantly lower than from the other. The salt concentration of sweat from a single hand was raised or lowered within 30 minutes by a corresponding raising or lowering of the hand temperature. This effect of local temperature on sweat chloride was independent of the rectal temperature during the exposure. It was not dependent on an increased rate of sweating from the region of higher temperature, and it was found at all stages of acclimatization.

Acclimatization reduced the concentration of salt in hand-sweat when large volumes of sweat were secreted during daily exposures to work in the heat. In series of experiments in which men sweated 5 to 6 kgm. per day, acclimatization caused significant reductions of sweat chloride on the second and third days of exposure.

Thomas Bedford

HORNE. G. O. & MOLE, R. H. **Anhidrotic Heat Exhaustion.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1950, Sept., v. 44, No. 2, 193–222, 6 figs. & 4 pls. [28 refs.]

This is an important contribution to a clinical syndrome found in the tropics and sub-tropics which has been variously described as heat exhaustion type II by LADELL, *et al.* [this *Bulletin*, 1945, v. 42, 143] in Shaiba, Iraq; thermogenic anhidrosis by WOLKIN, *et al.* [*ibid.*, 1944, v. 41, 785] in the American desert, and by ALLEN and O'BRIEN [*ibid.*, 1945, v. 42, 313] as tropical anhidrotic asthenia in Northern Australia and New Guinea. The present authors have based their paper on 62 cases from the Karachi area of Pakistan and four from Cawnpore in India. The syndrome is therefore widespread, but it has only been recognized in the last few years, a remarkable omission in view of the extensive work that has been carried out on heat effects from the 1914–18 war onwards.

Clinically, the sequence of events was invariable. Firstly, there was prickly heat, improvement of which was associated with reduced sweating and the characteristic skin change called "mammillaria". The onset was sometimes gradual, with exhaustion, usually raised temperature and often polyuria. Direct exposure to heat or exertion sometimes resulted in sudden onset, with much distress, tachycardia, breathlessness and even clouded consciousness and collapse; hyperpyrexia might then occur. Rest and cooling rapidly relieved such acute symptoms, which were succeeded by the milder symptoms of exhaustion.

The anhidrosis lasted for 2 weeks to 3 months (average 6 weeks). Skin sepsis and hyperpyrexia were complications. Apart from this the prognosis is favourable, but where prolonged detention in hospital is necessary psychological complications may occur.

The reasons that have prevented its earlier recognition are that it is only in wartime that large numbers of unclimatized Nordics undertake severe physical exertion in the heat of the summer in the tropics and sub-tropics. The ingestion of additional salt as a prophylactic against heat exhaustion may possibly, as HORNE and MOLE have already pointed out [this *Bulletin*, 1950, v. 47, 80] increase the severity of prickly heat and by so doing lead to tropical anhidrosis in the worst cases; whether anhidrotic heat exhaustion develops depends on the nature of the man's activities and his environment. The characteristic "mammillaria" diagnostic of the condition are by no means obvious unless they have been seen before and in fact the reviewer confesses with regret that although he was only too familiar with heat exhaustion and heat hyperpyrexia, he completely failed to recognize tropical anhidrosis until the authors demonstrated their cases to him and he was able to carry out a biopsy.

The discrepancies and omissions in the clinical findings in this widespread syndrome may be explained by the varying climatic conditions, and by the fact that the different observers investigated the problem from different angles. LADELL *et al.*, concentrated mainly on the biochemical findings, HORNE and MOLE on the anhidrosis before and after exercise, with the use of talc powder containing 0·5 per cent. gentian violet as an indicator, in addition to carrying out biochemical analysis of sweat and plasma; WOLKIN *et al.*, investigated their eight cases on somewhat similar lines, while O'BRIEN carried out an exhaustive and comprehensive histological examination of biopsies from prickly heat and tropical anhidrosis, and his findings clarify the clinical picture. According to O'BRIEN [this *Bulletin*, 1948, v. 45, 361] the sequence of events is as follows :—

(1) Miliaria rubra (prickly heat). The acute phase of sweat duct occlusion due to a keratinized plug.

The following table shows the principal features described by the various observers

	Physical and mental asthenia.	Headache and vertigo.	Burning sensation of skin on exercise.	Dyspnoea and palpitation.	Polyuria, frequency of micturition.	Sequence of severe prickly heat followed by cessation of sweating and alleviation of itching. Face, hands and feet sweating profusely, trunk dry.	Mammillaria over non-sweating area.	Chloride concentration of sweat high.	Blood chlorides normal. Urinary chlorides present.	No improvement on taking extra NaCl.	Complications, impetigo boils icthyosis.	Enlarged lymph glands.
Anhidrotic Heat Exhaustion. HORNE and MOLE[1] (Pakistan)	+	+	+	+	++62%	+	+	+	+	+	+40%	+
Heat Exhaustion. Type II. LADELL *et al.* (Iraq)	+	+	+	+	++80%	+	No description of this	+	+ or slightly reduced	+	+	0
Thermogenic Anhidrosis. WOLKIN *et al.* (American desert)					No record of this	No word of prickly heat but describe absence of sweating of trunk and excessive sweating face	Mammillaria described as "goose flesh" appearance of skin	Not investigated	Few observations but said to be normal	+	0	0
Tropical Anhidrotic asthenia. O'BRIEN (New Guinea)	+	+			No record of this	+	+	Not investigated	No records made		+	+

(2) Tropical anhidrosis (mammillaria of Horne and Mole). The chronic stage of sweat duct occlusion associated with relief of itching.
(3) Tropical anhidrotic asthenia.

The metabolic results arising from the preceding condition, especially when 50 per cent. of these sweat glands are obstructed ; it is synonymous with anhidrotic heat exhaustion.

O'Brien described the " goose flesh " appearance called mammillaria by Horne and Mole as follows, " The affected skin appears very similar to ' goose flesh '. The lesions are not associated with hair follicles but are deep vesicles which appear like sago grains implanted within the skin. Each vesicle represents a corresponding obstructed sweat gland ". [In view of O'Brien's histological findings showing how the condition is a chronic stage of miliaria rubra, the reviewer would make a plea for the term miliaria alba in place of mammillaria for this lesion. The name has been suggested to him by O. N. G. Clark who is at present carrying out investigations on prickly heat. Miliaria alba does suggest the aetiology of the lesion.] Horne and Mole are publishing later their histological findings in biopsies of the skin from these cases, and it will be most interesting to compare their findings with other observers.

The paper discusses the syndrome, the results of investigations, the aetiology and the climatic and environmental factors at length. A number of illustrative case histories are given and there are many tables and figures. The main environmental factor determining the occurrence of anhidrotic heat exhaustion was the minimum dry-bulb temperature. At Karachi, a minimum temperature of 84° to 86°F., with a humidity of 80 per cent. was responsible for a sudden outbreak of 58 cases.

The differential diagnosis is discussed ; for this and other clinical features, the original paper should be consulted.

Prophylactic measures discussed include reduced hours of work, avoidance of physical exertion in the heat of the day, leave in cooler areas and greater respect for prickly heat.

In conclusion the reviewer would plead for a simpler nomenclature and would like to see the effects of heat classified as follows :—

Miliaria rubra (prickly heat)
Miliaria alba (tropical anhidrosis) — Without symptoms / With asthenia
Heat exhaustion
Heat hyperpyrexia

Redundant terms such as sunstroke, heatstroke, heat exhaustion Type II etc., should disappear from the literature.] *T. C. St. C. Morton*

MISCELLANEOUS DISEASES

GELFAND, M. **Tropical Phlebitis and other possibly related Vascular Disorders in Tropical Africa.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1950, Jan., v. 43, No. 4, 369–88, 11 figs. (6 on 2 pls.). [22 refs.] Discussion 388–93 [DE NAVASQUEZ, S. ; WILLCOX, D. R. C. ; HARPER, J. ; TUCKWELL, E. G. ; CHESTERMAN, C. C. ; HACKETT, C. J. ; MURGATROYD, F. ; GELFAND, M. (in reply)].

The first reference to a tropical primary phlebitis was by FISHER in 1941 [his *Bulletin*, 1942, v. 39, 199] ; he had observed the condition mainly in Africans in Northern Rhodesia. In 1943 GELFAND [*ibid.*, 1945, v. 42, 78] gave a clinical account of the disease and in 1946 MANSON-BAHR and CHARTERS

ibid., 1946, v. 43, 1186] reported an apparent epidemic of thrombo-phlebiti in East Africa.

The best pathological description of this condition is that by FISHER FISHER and LENDRUM [this *Bulletin*, 1948, v. 45, 545]. The special feature o these authors' histological observations in this condition was that, in additio to marked phlebitis involving all three coats of the vein by a chronic granulatin process, there is a striking infiltration of the surrounding connective tissue Clinically this is shown by a disproportionate thickening of the vessel. It wa often noticeable that the clot was recent while there was extensive fibrosi and new tissue formation in the vessel wall and perivascular tissues, suggestin the possibility that the process started in the perivascular tissues and sprea inwards. An artery in the vicinity may be involved, but, as the arterial wal is thicker, it can resist the infection better. [This point was also emphasize by Dr. S. DE NAVASQUEZ in the discussion.]

The typical clinical history was one of sudden onset of a febrile disturbanc in an otherwise healthy young African who complains of severe pain ove the affected vein, *e.g.*, in the groin and front of the thigh in femoral thrombosis After a few days there will be peripheral oedema with continuing pain an constitutional disturbance. Later the oedema tends to subside but there is a acutely tender swelling at the side of the thrombus. In other areas, differen tissues will be involved, *e.g.*, subclavian involvement will result in oedema o the arm and shoulder and the jugular vein in swelling of the neck, face an eyelids, which if it is bilateral may suggest nephritis. The oedema is mainl due to arterial and arteriolar spasm. In the author's cases the sites attacke were the femoral veins (6 cases), cervical (11 cases), calf and foot (7 cases) and the portal vein (1 case).

The prognosis is much more serious when visceral vessels are attacked cases involving the superior mesenteric, the splenic and the portal veins, an the sagittal and cavernous sinuses have been reported.

Serious sequelae include multiple infarction of the spleen, total spleni infarction with abscess formation, and gangrene of the extremities.

The possible relationship between tropical phlebitis and tropical myositi is discussed.

In discussing the aetiology, the author points out that the disease is almos completely confined to young otherwise-healthy male Africans. Nearly a Manson-Bahr's and Charters' patients had received intravenous arsphenamin injections for syphilis and 12 out of 15 of the author's cases gave a simila history. In another series, only 19 out of 147 patients had not received suc injections. Fisher, Fisher and Lendrum described inclusion bodies in larg endothelial or polyblast cells in their histological sections in this condition

In the discussion that followed Dr. S. DE NAVASQUEZ said that this conditio was quite distinct from other well-recognized inflammatory diseases of th peripheral blood vessels, such as periarteritis nodosa in which there was fibrinoi necrosis affecting the intima and media, and Buerger's disease in which ther was progressive thrombosis indicating severe intimal damage.

He questioned the observation of " inclusion bodies " as evidence of a viru infection.

DR. D. R. C. WILLCOX thought that the association of the taking o sulphonamides should be explored. Dr. J. HARPER said he had seen man cases of this condition in East Africa and that the patients were exclusivel those who had had intravenous arsphenamines for syphilis. It did not occu in other cases, *e.g.*, of gonorrhoea or chancroid, treated at the same centre wit sulphonamides.

Mr. E. G. TUCKWELL asked if any association with smoking had bee observed.

L. E. Napier

GELFAND, M. **Tropical Thromboangiitis of the Splenic Vessels and its relationship to Primary Splenic Abscess.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1950, July, v. 44, No. 1, 117–21, 2 figs. on 1 pl. [10 refs.]

Abscess of the spleen is by no means uncommon in South Central Africa [this *Bulletin*, 1922, v. 19, 616 ; 1945, v. 42, 78 ; 1948, v. 45, 551]. It has variously been attributed either to *Entamoeba histolytica* infection or to a vascular lesion akin to tropical phlebitis. Characteristic radiological evidence of the lesion is a large gas shadow in the swelling above a fluid level. Tropical phlebitis was first described as a clinical entity in South Central Africa [this *Bulletin*, 1942, v. 39, 199 ; 1949, v. 46, 573] ; it involves either large or small veins, and not uncommonly affects deeper visceral veins, such as the mesenteric or portal. In tropical phlebitis an associated disorder of the artery probably occurs in conjunction with inflammation of the vein [this *Bulletin*, 1946, v. 43, 1186 ; 1949, v. 46, 575].

Details are given of the findings at autopsy of an adult male African in Salisbury Native Hospital in 1948. In this case there was a gross thrombo-angiitis of the splenic vein and artery with extensive colliquative necrosis of the spleen pulp, forming a tumour measuring 10 inches by 8 inches within the splenic capsule, which contained 3 pints of bloody material. These findings prove beyond doubt that in some cases of tropical phlebitis an arteritis (probably secondary) is associated with the phlebitis, and also they reveal a clear relationship between tropical angiitis and primary splenic abscess. It is reasonable to suppose that this splenic abscess of the "primary" type was in fact secondary to the angiitis and thrombosis of the splenic vessels.

A. R. D. Adams

BERMAN, C. **Primary Carcinoma of the Liver among the Bantu Mineworkers of the Witwatersrand.** *Proc. Transvaal Mine Med. Officers' Ass.* 1950, June, v. 30, No. 320, 13–30, 18 figs. [91 refs.]

The author, whose work on this subject is well known [this *Bulletin*, 1941, v. 38, 540 ; 1942, v. 39, 488], now has records of 772 Bantu patients with carcinoma, admitted to Witwatersrand Mine Hospitals between 1925 and 1944 ; 86·8 per cent. of these had primary cancer of the liver. These cases occurred among a migratory Bantu population of 200,000 selected, adult males of average age 30 years. The annual incidence was 5 per 100,000 among the South African Bantu and 29 per 100,000 among the Portuguese Africans. No obvious aetiological reason was apparent for this difference. Composite statistics derived from available cancer records show that for all the Bantu races in Africa, males as well as females, the liver accounted for 50·5 per cent. of all cancers, while among the semi-Bantu of West Africa primary liver cancer accounted for 15·3 per cent. of all cancers.

Macroscopically there are two pathological groups, massive and nodular ; in the author's cases the weight of the liver ranged from 1,900 gm. to 7,100 gm., averaging 3,870 gm. Histologically there are two types : (1) *hepatocellular*, the most frequent form, which is considered to arise from the liver cells and consists of columns of cells with large hyperchromatic nuclei and no intercellular stroma. Regressive changes in the central cells of the columns and haemorrhages are common ; (2) *cholangiocellular*, which is believed to arise from the intrahepatic bile ducts, is far less frequent than the former and consists of columnar cells arranged in irregular alveoli in a fibrous tissue matrix or separated from each other by open spaces. A papilliferous structure may be produced by proliferation of cells into the cystic spaces. Both forms tend to invade blood vessels, giving rise to intrahepatic metastases, which by extension

through the inferior vena cava may reach the lungs. In the author's series, 60 per cent. of the patients had metastases outside the liver. Five clinical types may be distinguished :—

(1) "*Frank*" cancer of the liver, 62·7 per cent. of all cases, characterized by insidious onset, asthenia, cachexia, abdominal pain and enlargement of the liver, which may reach the level of the umbilicus ; ascites is an early sign and occurs in 55 per cent., jaundice occurs in 45 per cent. usually late, oedema and secondary anaemia are common and there is irregular fever in about 40 per cent. of the cases.

(2) "*Acute abdominal*" type, 8 per cent. of all cases, which follows rupture of a carcinomatous nodule or erosion of a blood vessel. The signs are those of intraabdominal haemorrhage and a definite diagnosis is only made at laparotomy.

(3) "*Febrile*" type, 8 per cent. of all cases, resembles tropical liver abscess in its clinical manifestations. There is acute pain and tenderness of the liver, which enlarges rapidly, accompanied by pyrexia. These cases are often operated on and their true nature is only revealed by histological examination of tumour material.

(4) "*Occult*" type, 16 per cent. of all cases. The onset is insidious and painless and the tumour is discovered during routine examination or at autopsy.

(5) "*Metastatic*" type, 5·3 per cent. of all cases. In these cases symptoms due to metastases appear before, and overshadow those of the primary. The prognosis in primary liver carcinoma is hopeless and treatment is palliative only.

Aetiology.—The disease chiefly affects males and 89 per cent. of 402 patients were under 40 years of age. The zone of high incidence extends from the West African coast, across south-eastern and eastern Africa, to south-east Asia, thence to Indonesia, China and Japan. Among the natives of these countries it is forty times as frequent as in Europe. The Bantu, Javanese and Chinese are the races chiefly affected. In view of the wide distribution of the disease among races which are ethnically different, and the finding by KENNAWAY [this *Bulletin*, 1945, v. 42, 150] that the American negro shows no higher incidence than do the white population, the cause must be sought in environmental factors rather than in racial susceptibility. In experimental animals cancer of the liver has been produced by various azo-dyes, some carcinogenic hydrocarbons, carbon tetrachloride, selenium and other substances. Cirrhosis of the liver is common in races which have a high incidence of liver cancer and is frequently met with in association with the latter. Cirrhosis-producing agents, such as schistosomiasis, intestinal parasites, alcohol, syphilis, or the consumption of highly spiced foods are often discovered in patients with primary liver tumours. In the Bantu recent observations have indicated that cirrhosis and other forms of liver damage may be due to chronic malnutrition, and that pellagra is accompanied by profound liver changes, due to lack of adequate foods during childhood and adolescence [this *Bulletin*, 1946, v. 43, 364]. The Bantu live on a diet of maize meal, fermented cow's milk and vegetables, with little meat, *i.e.*, a high carbohydrate diet, lacking in proteins and low in vitamins. A typical Bantu diet given to albino rats produced extensive liver damage. Beriberi and pellagra are widespread among Far Eastern races, whose staple diet is rice, while cirrhosis and primary liver cancer occur as frequently as among the Bantu. A liver already damaged by malnutrition may become more vulnerable to parasitic infestation, syphilis, alcohol, or possibly to some as yet undiscovered carcinogenic compound specific for the liver. The distribution of liver cancer over a large part of the world may depend upon a combination of negative deficiency and positive carcinogenic factors.

No opinion can be formed as to the time required by the tumour to reach a clinically detectable stage. The disease may remain latent for months, symptoms only appearing when the tumour has become large, has eroded a blood vessel, or has given rise to metastases. The Bantu labourers in the mines rarely stay longer than nine months at a stretch, and, as few patients are over 30 years of age, it can be reasonably assumed that the cancerous process must have begun early in life.

Replying to questions during the subsequent discussion, the author said that the consensus of opinion among pathologists was that alcohol did not play such a large part in the production of cirrhosis as was commonly believed ; cirrhosis was relatively infrequent in Europe and America by comparison with the Orient and Africa, and it was estimated that in the East approximately 20 to 25 per cent. of all cases of cirrhosis developed primary liver cancer, compared with 3 to 6 per cent. in Europe and America. FISCHER had found cirrhosis present in 10 per cent. of all autopsies in East Coast natives and in 2·5 per cent. in South African natives. VINT in Kenya had found that 6·7 per cent. of all Bantu autopsies showed cirrhosis of the liver.

An extensive list of references dealing with the subject is given and several excellent microphotographs. *W. L. Harnett*

FINDLAY, G. M. **II. Observations on Primary Liver Carcinoma in West African Soldiers.** Reprinted from *J. Roy. Microscopical Soc.* 1950, v. 70, 166–72. [38 refs.]

Most of the statistics on the incidence of tumours in indigenous peoples in the tropics have come from hospital autopsies, or from material received for examination by research institutes ; in neither case are the figures truly representative of the population. Among 227,000 West African males, aged 18 to 40 years, recruited for the Army during 1940–45, there were 60 deaths from malignant disease, an incidence of 26·4 per 100,000 ; 37 of the 60 tumours were primary hepatic carcinoma. Among 50,000 European troops stationed in West Africa during the same years, there were 6 deaths from malignant disease, an incidence of 12 per 100,000, with no cases of hepatic carcinoma. Other authors have recorded that 8·1 per cent. of all tumours in natives of Nigeria were primary hepatic carcinoma [this *Bulletin*, 1948, v. 45, 650], while in the Bantu, liver cancer appears to constitute 37·4 per cent. of all malignant tumours, though some series of statistics report higher percentages. KENNAWAY [this *Bulletin*, 1945, v. 42, 150] has shown statistically that this is not due to racial factors. The average age of the patients in this series was 25 years, so that the cause begins to operate at an early age, and it is generally agreed that primary carcinoma is closely associated with cirrhosis of the liver.

Possible causes of cirrhosis are: (1) nutritional deficiencies, (2) infective hepatitis, (3) helminthic infestations and other factors.

(1) Experimentally acute liver-cell necrosis can be produced in rats by diets deficient in sulphur-containing amino-acids. The diets of West Africans are deficient in proteins and in vitamins of the B complex, especially riboflavin, nicotinic acid and pantothenic acid. In West African recruits evidence of riboflavin deficiency was almost the rule, in addition to the raw red tongue, cracked lips and scrotal dermatitis, gynaecomastia was occasionally seen, a finding which is sometimes said to be associated with primary liver cell carcinoma. On the rations supplied to these African soldiers all the signs of deficiency usually disappeared in from 18 to 24 months. The author quotes references to work on the experimental production of liver tumours and concludes that there is considerable evidence to suggest that a diet periodically deficient

in sulphur-containing amino-acids and in α-tocopherol may play a part in the production of necrosis and cirrhosis of the liver in Africans, other factors possibly having a secondary rôle. Nevertheless, carcinoma developed in West African soldiers who were fed continuously on a diet containing adequate calories and supplies of vitamins and proteins ; this applies also to Bantu mine workers on the Rand, who also developed primary liver cancer.

(2) Infective hepatitis is common in W. Africa and, though Africans were less susceptible than Europeans, the illness was more severe and prolonged and had a higher mortality in the former [*Bulletin of Hygiene*, 1948, v. 23, 381]. Studies of epidemics showed that the high mortality was closely associated with the deficient diet. Cases have been described in which a primary liver cell carcinoma was superimposed on the cirrhosis following infective hepatitis. Infective hepatitis must therefore be looked on as a possible precursor of carcinoma.

(3) Experimentally it has been found impossible to produce primary hepatic carcinoma in rats by deficient diets alone ; they appear to play an adjuvant rôle to carcinogens, such as certain azo-dyes. It is therefore possible that in the African cirrhosis of the liver and the subsequent primary carcinoma may be due to the combined action of a deficient diet and a toxic factor, such as the excretory products of certain parasitic worms. It has been shown that extracts of *Ascaris lumbricoides* and *Taenia saginata* injected into guineapigs, rats and cats cause necrosis of liver cells. Palm wine and millet beers are drunk in considerable quantities at certain times and are given to quite young African children and it is known that children given alcohol develop cirrhosis very rapidly. The toxic action of selenium and manganese in the diet has also been studied and it is possible that the malaria parasite may play a part by using up some of the limited supply of methionine in the diet. [For other recent papers on cancer in Africa, see this *Bulletin*, 1950, v. 47, 405, 666.]

W. L. Harnett

Jellison, W. L. & Gregson, J. D. **Tick Paralysis in Northwestern United States and British Columbia.** Reprinted from *Rocky Mountain Med. J.* 1950, Jan., 5 pp., 2 maps & 6 graphs.

The form of acute ascending paralysis known as tick paralysis, caused by the female *Dermacentor andersoni*, presents several peculiar epidemiological problems. There is considerable speculation as to the actual cause, though this appears to be a potent neurotoxin causing death of the patient if the tick is not removed. In the " tick season " a daily routine search for ticks on children is a regular precautionary measure. The disease is one more particularly of spring and early summer, March to September ; in the north-western United States 56 out of 64 cases occurred in the spring months and 24 in May alone ; in British Columbia 31 out of 34 occurred in the same months, but the April number, 14, slightly exceeded that of May, 12. Children under the age of 7 years are most often attacked ; among the north-western States' cases only 6 were adults and in British Columbia only 12. In children female cases predominated, about 2 to 1 ; this is ascribed to their long hair concealing the tick as it feeds ; of the 26 adult cases 22 were males.

Maps indicate the geographical distribution of cases and of the tick itself, and from these it will be seen that they by no means correspond. Cases are mostly limited to western Montana, northern Idaho, north-east Oregon, east Washington and southern British Columbia and most cases occur in the north-western part of the range of the tick. In other parts, though the tick is common, cases of tick paralysis are few, though Rocky Mountain spotted fever is frequent,

s in Utah, Nevada, California and the Sierras. In British Columbia 101 cases were reported—more than in all the north-western States—but only two of spotted fever. In fact, cases of the paralysis are concentrated to part only of the range of the tick—a very puzzling fact in the aetiology of this disease.

H. Harold Scott

PROTOZOOLOGY : GENERAL

Beltrán, E. & Pérez, R. Protozoarios parásitos de las ratas en la ciudad de Mexico. [**Protozoal Parasites of Rats in Mexico City.**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1950, Mar., v. 11, No. 1, 71–8. [25 refs.]

The English summary appended to the paper is as follows :—

" 1. Two hundred living specimens of the brown rat (*Rattus norvegicus*), caught at Mexico City, were examined both for intestinal as well as for blood protozoa.

" 2. No single case of infection with *Endamoeba histolytica* was found. On account of that, and according to the data contained in the literature, the authors think the rat is unimportant as a potential reservoir of this human parasite.

" 3. One specimen was found parasited by *Schizotrypanum cruzi*. This point has been treated in detail elsewhere."

Sabin, A. B. **Complement Fixation Test in Toxoplasmosis and Persistence of the Antibody in Human Beings.** *Pediatrics.* Springfield, Ill. 1949, Oct., v. 4, No. 4, 443–53. [15 refs.]

This investigation was carried out to determine whether the complement fixation test can be used for the diagnosis of human toxoplasmosis, especially in symptomless infections which are thought to be more common than has previously been suspected. For this purpose an antigen was prepared from the chorioallantoic membranes of chick embryos infected with *Toxoplasma*, from which a non-specific component, capable of fixing complement, was removed by centrifugation. The tests were carried out in 16 children between the ages of 5 weeks and 11 years, all of whom showed clinical symptoms of congenital toxoplasmosis, and in 17 mothers who had given birth to children suffering from toxoplasmosis but themselves showed no symptoms of the disease. With the methods used even titres of 1 : 2 and 1 : 4 were significant and were associated with the toxoplasm-neutralizing antibody. The sera of all the mothers gave positive reactions with titres from 1 : 4 to 1 : 64, the higher titres being more common during the first two years after birth of the infected child. In the children positive results—confirmed by neutralization tests—were obtained in 14 cases (87·5 per cent.), with titres from 1 : 2 to 1 : 128, the higher titres again predominating during the first 2 years after birth. On the other hand, all tests with sera obtained from children with congenital ocular or neurological disturbances, or both, of non-toxoplasmic origin gave negative results. It was also demonstrated that the complement fixation antibody can persist for at least six years in persons with and without clinical symptoms, and even in those in whom the infection has apparently been eradicated. Thus the reaction was positive in mothers of infected children who subsequently gave birth to normal children.

C. A. Hoare

GROCOTT, R. G. **A Case of Canine Toxoplasmosis from the Canal Zone.** *Amer. J. Trop. Med.* 1950, Sept., v. 30, No. 5, 669–75, 8 figs. [16 refs.]

"1. A case of naturally occurring toxoplasmosis in the dog is reported. It is the first instance of canine toxoplasmosis reported from the Canal Zone.

"2. Similarity of pathologic changes in human and animal toxoplasmosis is stressed. Calcific change due to parasitization of heart muscle is described.

"3. The possibility of various methods of transmission of the disease from the dog to man is discussed."

VAN THIEL, P. H. **Treatment of Experimentally Induced Toxoplasmosis with Sulphonamides, Arsenic Compounds and Antimalarial Drugs.** *Documenta Neerlandica et Indonesica de Morbis Tropicis.* Amsterdam. 1950, Mar., v. 2, No. 1, 51–8.

Using a human strain of *Toxoplasma* maintained by intracerebral passages in mice, the author carried out therapeutic tests with sulphonamides (percoccide, sulphamezathine, sulphadiazine, sulphapyridine, sulphathiazole, irgafen), arsenicals (acetylarsan, tryponarsil) and antimalarials. The sulphonamides, in a dilution of 1 : 16, were injected subcutaneously in doses from 0·1 to 0·2 ml. per 20 gm. mouse for 14 days at the most. The commercial solutions of arsenicals were injected in dilutions of 1 : 10 and 1 : 2·5. The solutions of antimalarials (chloroquine diphosphate 0·65 mgm., pentaquine monophosphate 0·166 mgm., isopentaquine 0·167 mgm., pamaquin 0·087 mgm., paludrine [proguanil] 0·3 mgm.) were used in doses of 0·2 ml. per 20 gm. mouse, while some of these compounds were combined with quinine hydrochloride.

Among the sulphonamides, percoccide (=sulphamerazine), sulphamezathine and sulphadiazine proved to have a curative action in mice infected with toxoplasms intracerebrally, while the remaining sulphonamides used had no action in these infections but were effective against mice infected intraperitoneally. By successful re-infection of mice which survived after treatment it was shown that the destruction of the parasites did not confer true immunity, but the acquisition of "infection immunity" [=premunition] could not be excluded. Neither the arsenicals nor the antimalarial drugs had any therapeutic effect on the toxoplasm infections in mice. Of the three effective sulphonamides, the author particularly recommends, for use in human toxoplasmosis, percoccide, because it is quickly absorbed, relatively slowly excreted and can be administered for a long period of time. *C. A. Hoare*

ENTOMOLOGY AND INSECTICIDES: GENERAL

GORDON, R. M. **Reactions produced by Arthropods directly Injurious to the Skin of Man.** *Brit. Med. J.* 1950, Aug. 5, 316–18.

Lesions produced by arthropods in the skin of man can be divided into four well-defined groups. In the simplest case, the lesion is due only to mechanical trauma and its extent depends on the size and structure of the insect's mouth-parts and on the manner in which the insect uses them. The damage is greater in the case of tissue-invading arthropods such as *Chrysomyia* sp. and *Sarcoptes scabei*, particularly when human tissue is invaded by an insect normally parasitic on another host. The second group is formed by complications of the first, where secondary infection has occurred. The characteristics of "myiasis" are often due more to bacteria than to Diptera.

The more or less trivial damage caused by an insect bite can be aggravated by the reaction of the host to some substance injected into his tissues by the insect's mouth parts. The author does not think that there are many insects which inject a substance which is, strictly speaking, toxic. The characteristic weal occurs only when the host has previously been sensitized to the bite of the insect in question.

Although very few parasitic arthropods are in any sense venomous, a large number of non-parasitic insects, and more particularly arachnids, are capable of inflicting a venomous bite or sting. Here again the consequences of attack are greater in a sensitized person.

The author also investigated the claims of some persons that, for example, they were never bitten by mosquitoes. On a number of experiments with such persons it was found that they were bitten as often as were the controls, but, provided that they could not see whether or not they were being bitten, they maintained that they had not been attacked. This is presumably because they have never been sensitized, or because their prolonged exposure to bites leads to desensitization. [See also this *Bulletin*, 1947, v. 44, 364 *bis* ; 1949, v. 46, 514]. *J. H. Sudd*

KEISER, F. Der erste Fall von Ophthalmomyiasis, hervorgerufen von *Oestrus ovis* L., aus der Schweiz. [**The First Case in Switzerland of Ophthalmomyiasis due to *O. ovis*.**] *Verh. naturf. Ges. Basel.* 1948, v. 59, 29–44, 6 figs. [49 refs.] [Summary taken from *Rev. Applied Entom.* Ser. B. 1950, Aug., v. 38, Pt. 8, 142.]

The author briefly reviews the literature on the bionomics of *Oestrus ovis*, L., and the kinds of myiasis caused by it ; when it infests man, the site of infestation is chiefly the eye. Previous records of such infestation are listed in a table and an account is given of a case in September 1947 in which 12 first-instar larvae were extracted from the eye of a workman in Basle. The first-instar larva is described.

BERNET, J. Prophylaxie des myiases sanguicoles en Afrique. Destruction des larves d'*Auchmeromyia luteola* (Vers de cases) par le D.D.T. [**Prophylaxis of Myiasis caused by Blood-Sucking Larvae in Africa. Destruction of Larvae of *Auchmeromyia lutella* by DDT.**] *Bull. Méd. de l'Afrique Occidentale Française.* 1949, v. 6, No. 2, 163–5.

i. TOUMANOFF, C. Contribution à l'étude des Tabanides de l'Indochine. Première note : Description de quatre espèces nouvelles. [**Study of Tabanids of Indo-China—Description of Four New Species.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 5/6, 372–81, 10 figs. on 4 pls.

ii. ——. Contribution à l'étude des Tabanidés de l'Indochine. (Deuxième note : Description de trois espèces nouvelles.) [**Study of Tabanids of Indo-China. Description of Three New Species.**] *Ibid.* 381–4, 4 figs. on 2 pls.

i. Illustrated descriptions are given of four new species of *Tabanus* from Indo-China ; they are *T. indosinensis*, *T. granti*, *T. nantae* and *T. aurisetosus*. *T. oknos* is also illustrated and systematic notes given on this species and on *T. rufiscutellatus*.

ii. The species described and illustrated in the second note are : *T. muscoides*, *T. flavioculatus* and *T. roubaudi*. *H. S. Leeson*

PICK, F. L'inclusion temporaire des oeufs d'*Aedes aegypti* à l'aide de la technique de silico-gel sur lame. [**Survival of Eggs of *Aëdes aegypti* on Silica-Gel Medium.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 5/6, 364–72. [16 refs.]

The author describes a method of preparing and sterilizing silica-gel and the adjustment of its *p*H. Petri dishes containing the medium were placed in cages of *Aëdes aegypti*; the females laid their eggs on it and they were kept for varying periods at laboratory temperature. Viable eggs were preserved for as long as seven months and it was shown that silica-gel with a *p*H of 7 was more favourable than that with a *p*H of 5, and that survival of the eggs was independent of the drying of the medium.

Eggs were also placed in silica-gel on slides for microscopical examination and even after being left for 4 weeks, fifty per cent. of them produced larvae when washed off into water. It is suggested that this method of microscopical examination of living mosquito eggs might be of value in the study of the eggs of other mosquitoes, as for example the races of *Anopheles maculipennis*

H. S. Leeson

LACASSE, W. J. **Mosquito Control Problems in Japan.** *U. S. Armed Forces Med. J.* 1950, July, v. 1, No. 7, 812–17.

Japanese encephalitis is the most important mosquito-borne disease in Japan, dengue and malaria being less serious problems. Serological tests show that a large proportion of the population have been infected with the virus at some time. The ratio of clinical manifestation to unapparent infection is between 1 : 300 and 1 : 1,000. *Culex tritaeniorhynchus* and *C. pipiens pallens* are incriminated as vectors of encephalitis, *Aëdes albopictus* of dengue, and *Anopheles hyrcanus sinensis* of malaria.

The practices associated with agricultural pursuits create a large proportion of breeding habitats. Rice paddies are flooded and remain so during the optimum mosquito breeding period, a network of drainage and irrigation ditches contain stagnant water, night soil tanks dot the landscape; smaller breeding places exist in the innumerable artificial containers of water. Temperature and rainfall have a marked influence on mosquito breeding, the conjoined effect resulting in heavy mosquito production during June, July and August. The land area affected is about 34,000 square miles so that control on a nation-wide basis is not a feasible proposition. Even localized trials [methods and materials are not mentioned] left a residue mosquito population large enough to be a serious pest and menace to health. "The task ahead is tremendous if the ultimate goal is mosquito control, limited even to the large population centres."

R. Ford Tredre

GJULLIN, C. M. **A Key to the Aedes Females of America North of Mexico (Diptera, Culicidae).** Reprinted from *Proc. Entom. Soc. of Washington*. 1946, Dec., v. 48, No. 9, 215–36, 2 figs. [10 refs.]

HOCKING, B., RICHARDS, W. R. & TWINN, C. R. **Observations on the Bionomics of some Northern Mosquito Species (Culicidae : Diptera).** *Canadian J. Res.* Sect. D. Zool. Sci. 1950, Apr., v. 28, No. 2, 58–80, 17 figs. (10 on 2 pls.) [17 refs.]

PETERS, R. F., THURMAN, D. C., Jr., MARKOS, B. G. & MULHERN, T. D. **The Unfolding Program of Vector Control in California with reference to Studies of Mosquito Biology.** *J. National Malaria Soc.* 1950, June, v. 9, No. 2, 173–5.

The principal mosquito problems of California are related to irrigation water in the Central Valley. At present about four million acres are irrigated, which is about half the potentially irrigable area ; therefore the difficulties of control are likely to increase with agricultural expansion. Another complication is that there are signs of increased resistance of the mosquito larvae to chlorinated hydrocarbon insecticides.

The chief vector of malaria in the past when malaria was prevalent was *Anopheles maculipennis freeborni*. This breeds intensively in irrigated rice fields and it is an important fact that rice growing has increased greatly in recent years.

The mosquito *Culex tarsalis* is recognized as being the chief vector of virus encephalitides in California, though it has a preference for biting birds rather than man. It breeds in almost any accumulation of non-brackish water.

Aëdes species are the most annoying biting mosquitoes. *Aëdes nigromaculis*, which was only introduced in 1937, now occurs in almost unbelievable numbers, breeding in the irrigated pastures of the Central Valley. *Aëdes dorsalis* has the same habits and is almost as numerous. Both species and *Aedes vexans* are able to carry the viruses of one or more of the encephalitides, and they possibly do so to a certain extent, in nature.

The control of these various mosquitoes cannot be effectively carried out until a more thorough study has been made of their biology, ecology and distribution. *J. R. Busvine*

BLANTON, F. S., TRAVIS, B. V., SMITH, N. & HUSMAN, C. N. **Control of Adult Mosquitoes in Alaska with Aerial Sprays.** *J. Econom. Entom.* 1950, June, v. 43, No. 3, 347–50.

TRAVIS, B. V., APPLEWHITE, K. H. & SMITH, N. **Control of Mosquito Larvae in Alaska with DDT.** *Ibid.*, 350–53.

In summer 1949, experiments were undertaken in Alaska to determine whether aerial spraying of DDT could be used to control the hordes of mosquitoes which emerge in early summer in the sub-arctic areas. Isolated plots of different sizes were selected, ranging from 4 to 100 square miles in area, in forested regions near Fairbanks and treeless tundra near the Arctic Circle. The spraying was done with a "C-47" aeroplane of the Alaskan Air Command, fitted with a specially designed spraying system. The sprays were applied at 800 foot swathe intervals and cross-wind. Most spraying was done at night, since it was found that more spray reached the ground than in the day and results were better. Most of the spraying was done with 20 per cent. DDT concentrate, which was more convenient (less bulky) than lower dilutions. Some duplicated tests on small (4 sq. mile) plots, showed no marked difference in results from 5 or 1 per cent. sprays at the same rate of DDT per acre. The authors claim that addition of emulsifier improved the performance of 20 per cent. DDT but in view of the variability of results, this seems dubious. The DDT was applied at the rate of 0·05 to 0·1 lb. per acre. Effects of the sprayings were assessed by the numbers of mosquitoes landing on the front of the trousers of a stationary observer in a period of three minutes. In some areas, the mosquitoes were so numerous that counts on the back of a glove had to be substituted.

The largest plot was 100 square miles. This was sprayed once to kill larvae shortly before the general emergence period. It was observed that the numerous *Aëdes* emerging all round this plot had penetrated to the centre in annoying numbers in about three days. Further sprayings were made against the adults, with somewhat better success ; but even this gave only about two weeks' relief from the appalling mosquito nuisance. A table is given, which shows the settling rates at different points from the centre to the periphery of this plot. Additional tests were done on three other plots, 16 to 24 sq. miles in area. In the plot of 16 sq. miles, the mosquitoes infiltrated within 13 hours.

The general conclusion to be drawn is that single sprayings of large areas do not give much relief and the only hope of controlling the nuisance appears to be regular spraying of small areas.

ii. Experiments on the larvicidal effects of air sprays had been made earlier on the plots mentioned in the first paper. The large 100 sq. mile plot was sprayed at 0·1 lb. DDT per acre, with 3,570 (U.S.) gallons of spray, in 8½ hours. Random dips were made across the 10-mile transect before and 48 hours after spraying. A total of 2,110 dips before treatment produced 6,403 larvae and 30 pupae, while 1,609 dips afterwards showed only 314 larvae and 16 pupae, a reduction of 94 per cent.

Similar or better results were obtained in comparative tests on the small (4 sq. mile) plots. These tests indicated that more dilute sprays (5 per cent.) gave slightly better results than the 20 per cent. concentrate mainly used.

Observations were continued on a number of plots which had been treated with 0·5 to 2 lb. per acre of DDT in autumn 1947 and spring 1948. These pre-hatching treatments had largely suppressed breeding in summer 1948. The breeding observed in 1949 depended largely on the type of vegetation present. Sedge and grass marshes treated in 1947–8, contained fewer larvae than the untreated surrounding marshes ; the reduction was of the order of 90 to 97 per cent. Large larvae, taken from adjacent marshes and put into pools in plots treated a year before, died within 48 hours. Plots of scrub-birch-*Myrica* and moss-heath-*Myrica*, however, showed no reduction in larvae and no evidence of persistence of the previous year's DDT. *J. R. Busvine*

Twinn, C. R. **Studies of the Biology and Control of Biting Flies in Northern Canada.** Reprinted from *Arctic*. 1950, Apr., v. 3, No. 1, 14–26, 11 pls.

The author provides an excellent general account of those very serious pests, the biting insects of Arctic and Subarctic Canada. The greater part of the irritation is caused by numerous species of *Aëdes* and *Simulium*.

The general biological problem is explained and well illustrated. Current work on control is described. *P. A. Buxton*

Arnason, A. P., Brown, A. W. A., Fredeen, F. J. H., Hopewell, W. W. & Rempel, J. G. **Experiments in the Control of** *Simulium arcticum* **Malloch by means of DDT in the Saskatchewan River.** Reprinted from *Scientific Agric.* 1949, Nov., v. 29, 527–37, 2 figs. (1 map).

Parker, A. H. **Studies on the Eggs of certain Biting Midges** (*Culicoides* **Latreille**) **occurring in Scotland.** *Proc. Roy. Entom. Soc. of London.* Ser. A. 1950, June 15, v. 25, Pts. 4–6, 43–52. [11 refs.]

ROZEBOOM, L. E. **The Identity of the *Phlebotomus* associated with Bartonellosis in Colombia.** *Ann. Entom. Soc. of America.* 1947, v. 40, No. 4, 705–14, 20 figs. [Summary taken from *Rev. Applied Entom.* Ser. B. 1950, Aug., v. 38, Pt. 8, 138–9.]

The sandflies (*Phlebotomus*) taken from an area in southern Colombia where an epidemic of the severe form of bartonellosis known as Oroya fever had occurred in recent years included two that were described by Ristorcelli & Dao Van Ty, as *P. colombianus* and *P. monticolus incarum*. In 1943, the author received from Colombia a small series of females that he provisionally identified as *P. verrucarum*, Tns., but in 1945, Hertig reported that he was unable to find any Peruvian *Phlebotomus* in Colombia, and doubt was thus cast on the identification. Study of a large series of *Phlebotomus* from the bartonellosis region of Colombia showed most of them to be *P. m. incarum* or *P. colombianus*, but it was soon clear that the females could not be separated by the characters given by the authors and that no differentiating characters could be found between the females from Colombia and *P. verrucarum* of Peru as described by Shannon and Hertig.

A detailed comparison was accordingly made of both sexes of the Colombian sandflies and of *P. verrucarum* from Peru, and the results of the study are given. The principal difference between the females of *P. colombianus* and *P. m. incarum* according to the original descriptions is in the structure of the spermatheca. However, separation of the Colombian females into groups according to the published characters revealed the existence of a third large group that could not be assigned with certainty to either of the other two, and no supplementary characters were found to support the grouping. No real differences could be found between these Colombian females and *P. verrucarum*, and apparent differences in the spermathecae were shown to be due entirely to the degree of collapse. It is concluded that there is no clear way of separating the female of *P. verrucarum* from the Colombian specimens studied by the author or those described by Ristorcelli & Van Ty as *P. colombianus* and *P. m. incarum*. As, moreover, all the 42 Colombian males associated with the females studied were the same, *P. m. incarum* is considered a synonym of *P. colombianus*. The male of *P. colombianus*, which is described, can be separated from that of *P. verrucarum* on the basis of a difference in the shape of the apical portion of the median clasper, but whether the Colombian form should have specific or subspecific status cannot be determined by morphological comparisons. It appears to be similar to *P. verrucarum* in its habits, especially in its readiness to attack man, and as it predominated in collections of sandflies from the bartonellosis area and many engorged individuals were taken in houses, it is thought to be responsible for the transmission of Oroya fever in Colombia.

HOLLAND, G. P. **The Siphonaptera of Canada.** *Dominion of Canada - Department of Agriculture. Publ. 817. Technical Bull. 70.* 1949, Sept., 306 pp., 44 maps & 350 figs. on 42 pls. [Bibliography.]

THÉODORIDÈS, J. **The Parasitological, Medical and Veterinary Importance of Coleoptera.** *Acta Tropica.* Basle. 1950, v. 7, No. 1, 48–60. 47 refs.

COMITÉ DES NOMS FRANÇAIS, ENTOMOLOGIE, UNIVERSITÉ DE MONTRÉAL. Liste officielle des noms français des insectes d'importance économique au Canada. **Official List of French Names of Insects of Economic Importance in Canada.** (Préparée en collaboration et publiée en supplément du rapport annuel de la Société de Québec pour la protection des plantes.) 1st Edition. 66 pp. 1947. Québec : Ministère de l'Agriculture.

LABORATORY PROCEDURES

HARDING, J. P. & WASHTELL, C. C. H. **The Labgear-Harding Micro-Dissector.** Reprinted from *J. Quekett Microscopical Club.* 1950, Mar., v. 3, Ser. 4, No. 2, 89–92, 1 text fig. & 2 figs. on pl.

The authors describe a micro-dissection apparatus, suitable for use up to magnifications of about ×100. It may therefore be used in dissecting mouth parts of small insects.

The apparatus consists essentially of two very fine needles, capable of being moved in three planes of space. The principle is that of a pantograph, the needle following the movements of the hands but on a greatly reduced scale. Focusing of the microscope is carried out by moving the knee, so that both hands are free for the dissection. The apparatus is available commercially.

P. A. Buxton

COLLESS, D. H. **An Improved Method for Mounting Mosquito Larvae.** [Correspondence.] *Nature.* 1950, Sept. 16, 486–7.

The medium developed by the authors consists of a solution of Canada balsam in phenol (BP) prepared by heating the Canada balsam to drive off any water present and adding phenol during cooling until a satisfactory consistency is obtained. Larvae are mounted direct from 95 to 100 per cent. alcohol, after the ventral surface of the thorax and abdomen have been finely pierced in several places. Mounts clear rapidly and are firm after several days in the sun.

A refinement, for use when perfectly clear specimens are required for special work, is to macerate specimens first in strong chloral hydrate solution (8 gm. in 20 cc.) or 30 per cent. acetic acid. After 24 hours in chloral hydrate, larvae should be washed in 90 per cent. alcohol and given a short phenol bath before they are mounted in phenol balsam. The resultant specimens are very soft and should be transferred to slides with a pipette. The method is applicable only to fresh material.

The author has found Bhatia's pine rosin to give equally good, and sometimes slightly better, results when used in phenol solution ; but the keeping qualities of the rosin have not been tested over a long period, so the author prefers to use balsam.

A more detailed account is to be published elsewhere.

H. J. O'D. Burke-Gaffney

SINGH, J., RAY, A. P. & NAIR, C. P. **A Preliminary Note on the Preservation of Unstained Blood Smears.** *Indian J. Malariology.* 1949, Dec., v. 3, No. 4, 327–9.

The deterioration of unstained blood films, particularly in the moist tropics, is well recognized, and no satisfactory method appears to have been devised for their preservation. The authors adopted the following method in an attempt to solve the problem. Thin films were fixed by immersion in methyl alcohol ; thick films were either untreated or, better, lysed with distilled water and dried. They were then wrapped separately in tissue paper and stored in a desiccator (with calcium chloride in the bottom chamber) which was placed in the refrigerator. The films were stained with J.S.B. or Giemsa stain at various intervals—after 6 months the staining compared favourably with that of fresh films and even after a year the results were satisfactory except for some lack of differentiation.

P. C. C. Garnham

FUHRMANN, G. Methode zur Bestimmung von Resochin im Harn. [**The Estimation of Resochin [Chloroquine] in the Urine.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1950, Sept., v. 2, No. 2, 279–87, 2 charts.

Resochin [aralen, chloroquine], a drug with marked antimalarial properties, is 4-(diethylamino pentylamino)-7-chloroquinoline. It is well tolerated by human patients and does not colour the skin. The author has developed a non-specific method for its estimation depending on the turbidity produced in solution by addition of a modified Tanret reagent. The latter is prepared by mixing 10 gm. KI dissolved in hot distilled water with 2·7 gm. HgI_2 in 150 cc. distilled water with addition of 2·5 cc. acetic acid. The mixture is stable for an indefinite time. The reagent is more sensitive when it is added to an acid solution of the base than when added to an aqueous solution. Turbidity was produced when 1 drop of the above reagent was added to a 1 in 1 million dilution of resochin and took about 15 minutes for maximal development. The procedure for estimation was to add 1 drop of iodide solution to 5 cc. of the base in solution in 0·2 N H_2SO_4. Absorption was measured in a Pulfrich photometer with " S61 " filter in a layer 1 to 2 cm. thick, generally 30 minutes after mixing, and accurate readings could be obtained over a further period of 45 minutes. In recovery tests in which 200 cc. of solution containing known amounts of resochin were shaken with 10 cc. of 50 per cent. KOH and extracted twice with 200 cc. ether followed by re-extraction into 0·2N H_2SO_4, the latter being heated on a water bath to remove dissolved ether, yields of 93 per cent. were obtained. When urine was treated in the same way the recoveries were 103–105 per cent. of theoretical because of a slight turbidity which frequently arises in normal urine in absence of resochin. Protein should first be removed by heat and filtration. A calibration curve was used in conjunction with determinations on unknown solutions. The test can measure 0·2 mgm. resochin in 200 cc. urine.

[No literature is quoted. The well-known methods of BRODIE & UDENFRIEND will detect 0·1 γ of resochin (this *Bulletin*, 1947, v. 44, 793).] *J. D. Fulton*

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS

ROCKEFELLER FOUNDATION. INTERNATIONAL HEALTH DIVISION. **Annual Report 1949.** pp. ix+229, 17 figs. on 10 pls. New York : 49 West 49th Street.

The report for 1949 contains a clear and short account of research work undertaken by the 56 staff members of the International Health Division and others on problems chiefly concerning malaria and virus diseases. Some of the work has been published and has already been abstracted in this *Bulletin*. It is impossible in this article to do more than pick out what seems to the reviewer most significant or useful.

Malaria.—Substances necessary for the metabolism of sporozoites *in vitro* have been shown to exist both in extracts of chicken erythrocytes and of mosquito tissues, though their exact constitution remains unknown. The free tissue merozoites from E.E. schizonts were shown to have much the same requirements as sporozoites. Studies of parasite metabolism have been facilitated by the improved methods of cultivation whereby three- to five-fold increases in the total numbers of parasites are now obtained. There was shown to be a rise in the copper content in heavily parasitized blood, which may be associated with a specific enzyme (=oxidase), necessary for the metabolism of the parasite. Artificial inhibitory substances (*e.g.*, cupron) have been discovered. Strains

of *Anopheles quadrimaculatus* partially resistant, and nearly 100 per cent. susceptible, to *Plasmodium* have been developed ; with *Aëdes aegypti* similar studies were unsuccessful [in this connexion compare the classical work of Huff —this *Bulletin*, 1930, v. 27, 892—with *Culex pipiens* and avian malaria]. The tissue phase of *P. cynomolgi* in monkeys has been further investigated. Sporozoites were inoculated directly into the liver and biopsies of the site were taken 1, 2 and 7 days after exposure. Pre-erythrocytic forms were found only after 7 days and were noticed to be irregularly distributed in the liver, not only at the site of inoculation, but even as distant as the other lobe of the organ. This preliminary schizogony (with evidence of arrested maturation of the parasites) in the liver parenchyma continues for at least as long as 15 days after infection but not after 55 days. A re-investigation of pre-erythrocytic schizogony of *P. gallinaceum* showed that cryptozoites were to be found only in the local tissue cells at the site of inoculation. [This hardly disproves the earlier evidence that the primary forms of *P. gallinaceum* are also to be found elsewhere, *e.g.*, the spleen.] Taxonomic studies have been made on (*a*) the *Culex pipiens* group and (*b*) the *Anopheles quadrimaculatus* group. A summary is given of the " Sardinian malaria campaign " ; it is pointed out that the eradication of *Anopheles labranchiae* is difficult because of the excessively sylvatic habits of this species ; malaria transmission has now entirely ceased and much new land is available for agriculture. In the state of Morelos in Mexico, residual DDT in houses has reduced transmission of malaria by 90 per cent. In the higher parts of Mexico (over 7,000 feet) *Anopheles aztecus* was proved to be the vector of the disease. This species (and *A. albimanus*) has been successfully colonized. The bromeliad problem in Trinidad [this *Bulletin*, 1950, v. 47, 600] has been solved by the discovery that a small amount of a dilute copper sulphate solution would kill these plant breeders of *A. bellator*. This species and other allied forms (of the subgenus *Kerteszia*) have been studied also in Brazil where dichlorphenoxyacetic acid was found to be superior to copper sulphate in killing the bromeliads. An interesting discovery was made in Formosa that the local monkey *Macacus cyclopis* harbours a new species of *Plasmodium* with an unusually long schizogonous cycle [one wonders how this parasite differs from *P. inui*].

Virus diseases.—The work on yellow fever in East Africa has largely been abstracted [this *Bulletin*, 1949, v. 46, 823 ; 1950, v. 47, 229]. In West Africa, Chwatt discovered a sylvan mosquito, closely allied to *Aëdes africanus* and named it *A. pseudoafricanus* [*ibid.*, 1949, v. 46, 823]. Predominantly crepuscular, it differs from the former in being less acrodendrophilic. It has been infected experimentally with the virus of yellow fever. In West Africa also, a new strain of mice was established which was 8 times as susceptible to the neurotropic virus as the present strain. The dispersion of forest mosquitoes has been further studied (after marking with bronzing powders) in Brazil ; *Haemagogus spegazzinii* was recaptured 11·5 kilometres from the point of release, *Aëdes leucocelaenus* 5·7 kilometres away and *Aëdes serratus* 11·5 kilometres. Specimens were found alive as long as 55 days after release. *Aëdes scapularis* managed to survive throughout the dry season and it is thought that the virus persists in this way. Full-scale investigations are now taking place on 18 new tropical viruses (some of which may prove to be identical with each other).

Sixteen out of the eighteen viruses were first found in wild mosquitoes and little is known about their pathogenicity to man. Instead of searching for the cause of a disease, here the customary procedure has been reversed and the qualities of potential disease-producing agents are being investigated by observing their physical and antigenic characters, growth in chick embryos, pathogenicity in animals and transmission by arthropods. Perhaps the most

interesting virus is the Mengo virus (of East Africa) now shown to be identical with the Florida virus of encephalomyocarditis, the New York human and rodent virus and with a human infection in the Philippines. The characteristic feature of this virus is its tropism for the myocardium, its capacity for producing a diffuse polioencephalomyelitis, and its presence in rodents in widely different parts of the world.

Uganda, East Africa	*Colombia*
Bwamba fever	Anopheles A
West Nile	Anopheles B
Semliki Forest	Wyeomyia
Bunyamwera	
Ntaya	*Brazil*
Mengo	Ilhéus
Uganda A	Leucocelaenus
Zika	Haemagogus A
	Sabethes
British Cameroons	Haemagogus B
Kumba	Mixed virus

Rickettsial diseases.—An outbreak involving 30 cases of Q fever occurred in California and the infection was traced to cows' milk. Another outbreak was associated with dairy goats on board ship. In sheep the disease is milder and shorter ; the sheep tick *Otoibus megnini* was found naturally infected. Useful work has been done on small mammals and their ectoparasites (on 14 species of mammals and 30 species of ectoparasites in Florida). Other studies on rodent ecology were carried out in Baltimore with particular reference to the factors governing increase and decrease of populations of rats and musk-rats. It was clearly demonstrated that killing rats alone was a useless procedure : it merely makes room for more rats to grow up and actually " increases the yield of rat flesh per acre per year ".

The latter part of the report deals with aid given to local health services and to schools of public health. *P. C. C. Garnham*

EVANS, W. J. M. **A Survey of a Tropical Area, Over-Populated by a Primitive People, and the Health Problems associated with the Resettlement of a Section Elsewhere.** *J. Roy. San. Inst.* 1950, Sept., v. 70, No. 5, 449–55, 1 map.

Tribal wars, barbarous customs, pestilence and famine used to discourage the growth of population of the peoples inhabiting the elevated basins and slopes of the mountain mass which culminates in Mount Kilimanjaro (20,000 feet) in Tanganyika. A cool and equable climate (latitude 3°S.) is a contrast to the hot, dry plains and the humid coastal zone. A purely subsistence economy on unlimited land has been replaced by an exchange economy involving the production of " cash crops ". Expanding production by primitive and wasteful methods led to soil erosion ; an expanding population now means too little food for too many mouths and famine is the result.

The Mlalo basin (5,000 ft.), some 41 square miles in extent, was selected to determine the facts, to find the most effective remedial measures and to formulate a policy which would be applicable to the whole hill area. Such a survey is a combined operation by technical specialists, involving among others the administrator, the agriculturist, the nutritionist and the doctor. The first task was the collection of vital statistics, by no means an easy matter in a primitive population. Enumeration was recorded by village, family, sex, relationship and age group. Then the same team visited each village monthly

for a year to record births, deaths, immigrants and emigrants. Age was recorded according to stages of African life and well-remembered events. There were 8,838 males and 9,638 females. Comparison with England and Wales of numbers in each age group per 1,000 people is as follows :—

Age Group.	Numbers living:	
	Mlalo, 1947.	England & Wales, 1946.
0–	252	80
5–	193	69
10–	80	107
18–	222	225
35–	179	232
50 (–74)	74	252
75–	—	35

The points of note are : (*a*) three times as many children under five years in Mlalo, despite a high infant mortality rate ; (*b*) a singular paucity of persons in the 10–17-year group, owing to epidemic disease, whooping cough and chicken-pox ; (*c*) the early middle-age groups are about equal but the over-50 group is much smaller in Mlalo. It is noted that 5·6 per cent. of " *de jure* population " are short-term emigrants. The crude figures gave a low infant mortality and a high stillbirth rate. On further enquiry the stillbirth figures were found to be based on the number of women returning to their husbands without a living child ; by custom a woman is delivered in the home of her parents. Clinic records gave a stillbirth rate of 53 per 100 births and other rates were calculated as follows :—

Estimated live birth rate ...	...	55/1,000 population.
,, crude death rate	...	25/1,000 ,,
,, infant mortality rate ...		124/1,000 live births.
,, fertility rate ...	...	293/1,000 women.
(child-bearing age 15–44 years)		

The remarkably high fertility rate (there are no spinsters) counterbalanced somewhat by stillbirths and infant mortality, accounts for a rapidly increasing population. Emigration or resettlement is a necessity. The major disease hazards confronting emigrants are malaria, tuberculosis and schistosomiasis. These health aspects are a part of the larger issue of general community welfare, administrative, agricultural, veterinary and educational. To quote the Director of Medical Services, Tanganyika :—

" If the health of the public in its most inclusive sense is, in fact, ' a people's war,' money is not our greatest need, nor, indeed, is imported manpower. The maternalistic attitude of constructing and manning medical establishments and dispensing medical services to a passive or indifferent people can do little more than mislead and pauperize the beneficiaries. Our concern must be to show the need, demonstrate the solutions, and expect the participation of the people in the practical solution of what are manifestly their own local government problems." *R. Ford Tredre*

Heisch, R. B. **Survey of the Kerio Valley.** *East African Med. J.* 1950, June, v. 27, No. 6, 233–42, 1 map.

The Kerio valley, which is typical savannah country, is traversed by the Kerio River which drains into Lake Rudolph in Kenya. At the area of survey it is some ten miles wide, 3,000 feet above sea level lying between escarpments

of 6,000 to 8,000 feet and within one degree of the equator. Tribesmen live on the slopes of these mountains and graze their cattle in the valley below. The object of the survey was to determine the suitability of the valley, practically uninhabited, for settlement of Africans from over-populated areas. Of 442 people examined on the lower slopes or at the foot of the western edge of the valley, only 3·1 per cent. had blood films positive for *P. falciparum*. *Anopheles gambiae* and *A. funestus* and several other anophelines were found in the valley. The species of culicines found are recorded, of which *Aëdes aegypti* and *Aëdes simpsoni* are of medical importance in relation to yellow fever ; the sera of eleven *Ceropithecus* monkeys and ten human beings showed no evidence of the existence of jungle yellow fever. Sandflies were difficult to find, but among those listed is *Phlebotomus clydei*, thought to be a vector of kala-azar in the Sudan. Of the ticks, *Ornithodorus moubata* and *Rhipicephalus sanguineus* and *R. simus* were prevalent without any evidence of relapsing fever or rickettsial infection. *Glossina longipennis* and *G. pallidipes* were the only tsetse flies caught. A detailed table of rodents and their parasitic fleas included predominantly *Xenopsylla cheopis*, *X. nubicus*, and *X. humilis*, the first found mainly on *Arvicanthis* sp., and the second and third mainly on *Tatera* sp. (gerbils). In the examination of over 200 rodents the only parasites were *Babesia* in a squirrel ; *Grahamella* occurred in some other animals. In the Africans living in the reserves west of the valley a moderate anaemia was widespread (72 per cent. haemoglobin, Tallquist). *Taenia saginata* occurred in half the population, but hookworm was uncommon ; other infestations, including that of *Ascaris*, were rare. An unexplained observation was the difference in incidence and severity of tropical ulcer in adjacent reserves. Venereal disease and tuberculosis were not major problems. Enlargement of the liver is frequently met and probably due to a dietetic deficiency.

The Kerio valley is potentially unhealthy owing to the presence of vectors of malaria, relapsing and tick-borne fevers, yellow fever and plague. Settlements would need to be placed on the high ground in the form of villages, which would facilitate control of disease. *R. Ford Tredre*

Talice, R. V. Remarques sur quelques cas de géographie parasitaire en Uruguay. [**Remarks on Geography and Parasitism in Uruguay.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 5/6, 290–94, 1 fig.

Though short and inconclusive, this article is an interesting contribution to the subject of climatology and parasitism, or, as the author calls it, "Biogeography". He refers to three conditions : 1. *Piroplasmosis* and *bovine anaplasmosis* exist only to the north of the Rio Negro though infected animals often cross to the south, because the transmitting tick, *Margaropus*, has "never been able to acclimatize itself to conditions south of the river", the reason for which is not known. 2. *Myiasis* due to *Dermatobia cyaniventris*. Again the Rio Negro separates the endemic northern region from the non-endemic south, except for one part where a tongue of endemicity has invaded, or projected into, the south. This area is clearly shown in a line map. 3. *Chagas's disease*. Though *Triatoma rubrovaria* and *T. circummaculata* are widespread over the whole country, *T. infestans* conveying *Trypanosoma cruzi* is common north of the river and one part of the south, but far from the sea and it does not reproduce itself or exist easily in coastal areas.

The question of microclimates is an interesting one and calls for much more study. In the instances cited the difference does not depend merely on temperature and moisture and the habits and dwellings of the people.

H. Harold Scott

BOOK REVIEWS.

WILCOCKS, Charles [M.D., F.R.C.P., D.T.M. & H., Director, Bureau of Hygiene and Tropical Diseases, formerly Medical Officer and Tuberculosis Research Officer, Tanganyika Territory]. **Health and Disease in the Tropics.** pp. x + 200, 33 figs. 1950. London: New York: Toronto: Geoffrey Cumberlege, Oxford University Press. [15*s.*]

This book, as the author states in his preface, is intended for officers of the Colonial Administrative Service in the first place, because it deals largely "with those aspects of public-health work which call for administrative action".

There are many books on tropical hygiene written for medical and non-medical readers, but none of them, so far as the reviewer is aware, covering precisely the ground of this work and there has hitherto been an important gap in the Colonial Administrative structure which is now filled in. It seems strange that detailed advice is often given to those about to go abroad as to the safeguarding of their personal health and what to do in emergencies, and instructions to doctors who may be called upon for directions and advice, but none on the vast responsibilities and comprehensive duties of those in charge, to whom a sound knowledge is essential for the rational application of health measures on a larger scale to benefit the peoples under their care and jurisdiction. The whole Colonial Service, administrative, agricultural, medical, sanitary officers and others not in the Service but living and working in tropical climates, missionaries, managers of estates, of mines and other industries, will reap benefit from this work.

The busy man is nearly always the one able to find time for just one thing more and it is fortunate that one so aptly qualified to carry out this work has, amid his multifarious duties, undertaken to produce it and has accomplished it so successfully. The author, as Director of the Bureau of Hygiene and Tropical Diseases, sees the reports from the various colonial territories and is kept *au courant* with their developments and needs; also he has lectured to University graduates who are destined to occupy administrative posts in the Service and others of responsibility, and has himself served abroad.

Administrative officers are in the end responsible for the health of those of whose affairs they are in charge; they must have a basic understanding of the problems confronting them and should know, as nearly as possible, the causes of infection, the mode of spread and the distribution; those in charge of smaller bodies, mine managers and estate owners, should also know something of the early treatment of disease, as they may be far from medical attention, and to this end some acquaintance with the clinical features is a *sine qua non*, but as "a little learning is a dangerous thing", the teaching must be sound and must not attempt to go too far and so make the possessor regard himself as infallible. The author, therefore, has indicated clearly where temporizing treatment must give way to the professional expert.

Before considering points in detail, we may say that the diction is clear, free from ambiguity, succinct without undue condensation, contains all that is necessary for laymen in responsible positions to know and written in a style which makes the book a pleasure to read; the print is clear, well spaced and margined, and the binding such as will not attract cockroaches and other insects, and of reasonable size so that it can easily be fitted, as it should be, into the personal belongings of every administrative officer.

The work comprises five sections each of which is subdivided into chapters. Section I, *Health and Disease*, has two chapters. The first has some general remarks on health. The author does not waste time and space on the effects of the varieties of tropical climate; these are fully dealt with in books on

climate, on physiology, on disease in the tropics, in many publications medical and lay, and most people soon acquire this knowledge and adaptation to the climatic vagaries from the advice of older residents and a short personal experience. The author stresses the importance of proper statistical returns to enable the administrative official to judge of the health conditions of those in his care and the effects of health measures introduced to improve them. Secondly, there is the need of officials not to contravene, if possible, local customs ; to do so might jeopardize plans and cause the best-laid schemes to " gang agley " and hence the need for co-operation of administrators with officials of the various departments—medical, veterinary, agricultural, forestry and surveying. Chapter II, the *Causes of Disease*, discusses the relations between parasite and host, with short accounts of protozoa, metazoa, bacteria, fungi and others ; that is to say, the causes of disease and their mode of spread and thus the rational methods of dealing with them. This is one of the best expositions of a complicated subject that we know of, accurate, succinct and clear. The accuracy might perhaps be enhanced by modification of the reference to worms in this chapter and in chapter XIII, where the size of cestodes is understated and that of nematodes overstated. " The largest [tapeworm] may be 10 feet or more in length and contains hundreds of segments " is true, but it is known that *Taenia saginata* grows up to 8 metres, say 25 feet, or more in length and contains up to 2,000 segments, and *Diphyllobothrium latum* to 30 feet (60 feet has been reported) with some 4,000 segments. Again, " the longest [nematode] measures several feet " (pp. 9 and 111), repeated on *Dracunculus medinensis* (p. 117), whereas the female Guineaworm measures up to only 3 or 4 feet, as does also *Dioctophyme renale*, formerly known as *Eustrongylus gigas*, probably the largest nematode. On p. 14 " . . . quartan fever, so-called because its periodicity is of about 72 hours " ; surely quartan fever is so-called because it causes fever every fourth (quartus) day.

Section II, *Communicable Diseases* comprises eleven chapters dealing in order with protozoal diseases, malaria and its complication blackwater fever, trypanosomiasis and the leishmaniases ; with virus diseases, yellow fever, dengue, sandfly fever and forms of encephalitis ; with rickettsial diseases of the typhus group ; some bacterial diseases, plague and tularaemia ; the insect-transmitted spirochaetosis, relapsing fever, louse-borne and tick-borne ; intestinal diseases, salmonelloses, amoebiasis, bacillary dysentery, the enterica group and cholera. Sprue is included in this section. The question of carriers, healthy and convalescent, is well discussed and it is good to see that the cholera carrier, in the true sense, is not thought by the author to exist. In subsequent chapters of this Section special diseases are considered, yaws, venereal spirochaetoses and other venereal diseases, leprosy, tuberculosis, bacterial and viral infective diseases such as smallpox, measles, mumps and poliomyelitis. The incubation period of typhoid fever is given as 10–15 days, but not infrequently it is as long as 21 days. The last chapter in this Section discusses helminthic infestations. Apart from those referred to above the author deals with the schistosomes, the liver and the lung flukes, *Echinococcus* and hydatid, *Ascaris*, the hookworms, threadworms and *Filariae*. Any comments we may have on this excellent Section can be stated quite briefly. We are glad to see the necessary warning against regarding all attacks of fever as malarial and it is not only the laity who do this. The reviewer has seen patient after patient suffering from typhoid fever treated for several days with quinine because the medical attendant did not examine the blood or send a specimen to the laboratory for diagnosis. The author calls attention to the admirable synchrony in filariasis between the appearances of parasites in the blood and the presence of mosquito vectors, and later he states " this periodicity is curiously adapted to the habits of the mosquitoes. . . ."

Some will think that too much stress is laid on the possible benefits of game destruction in eliminating trypanosomiasis. Nature, they will say, is not so barren of resource and would either find other animal reservoir hosts, or the tsetse flies would be led to attack man more fiercely in the absence of animals. The importance of consultation and co-operation between administrative officers and officers of other departments—medical, veterinary, agricultural, forestry, survey and educational—when proposing to transfer people from tsetse-infected to tsetse-free country is duly stressed. As regards yellow fever, one week for development of the virus in the mosquito before it becomes infective (p. 44) is unduly short, the average is usually taken as 12 days. Also (on p. 47) the patient " should be nursed, night and day, inside an efficient mosquito net so that there may be no danger of mosquitoes becoming infected from him, to carry the disease to the people ". Surely there is no need of the net for this purpose after the third (possibly the fourth) day of the fever ; on the preceding page this fact is definitely stated.

The mention of chloromycetin and aureomycin in the treatment of typhus is evidence that the information given in this book is right up to date. On pp. 58 and 60 it is stated that fleas inject the bacteria of plague by their bite. This may be so, but is it not equally likely that regurgitated and excreted bacteria are rubbed in by the subject when scratching the itching bite ? Under syphilis sound advice is given against self-treatment. When speaking of leprosy no mention is made of the ocular affections and complications which are most distressing. Under smallpox one would expect mention of alastrim, the form which may occur in widespread outbreaks and would have to be dealt with. A word or two more on the Helminthiasis chapter. Under *Taenia solium* is the statement "All segments should, therefore, be preserved for expert examination to see if the head is present ". Should not this be " all stools " ? Also, *Ascaris* " causes relatively little trouble unless . . . they became entangled into a knot or mass, and obstruct the intestine " ; but serious damage may be caused by migration, as into the pancreatic duct, the liver, or the glottis.

Now that sulphonamide creams and ointments are becoming popular and are indiscriminately used by the man in the street, it is wise on the part of the author to warn against the dangers of such practice ; also against the too vigorous use of the tourniquet in snake-bite and haemorrhage. A tourniquet is easily applied and the ready refuge of the too ardent first-aider. Mention might, perhaps, have been made of the use of carbolic soap, 5 per cent. emulsion, locally applied by infiltration to delay toxic symptoms of snake-bite until antivenin can be obtained, for it may be found in almost every household, or might be kept ready made up, with a syringe, at the local dispensary. It is rightly stated that the patient should be *carried* to the doctor ; absorption of venom is enhanced by his *running* thither in panic.

The importance of an administrative officer's obligations in time of famine and distress and the prevalence of deficiency disease and the need for consultation with departmental officials, the agricultural in particular, is rightly insisted upon, in order that preventive measures such as the growing of alternative crops, may be taken in hand in time. Though the striking symptoms may be medical, the remedies lie in the combined efforts of the administrative, political, social and economic officials. Chapter XVIII on *Diseases concerned* [? connected] *with Industry* is replete with commonsense, for the health of the workers is rarely safeguarded by law as in Britain and " it is the duty of government to see that workmen are protected against diseases they do not themselves understand and which industrial conditions tend to foster " (p. 145) and the custom in some industries to give part payment in food, often inadequate, ill-prepared and unpalatable, is deprecated ; in short, " It is the duty of all

government officers to insist that no exploitation of labourers is permitted" (p. 149). The danger of borrow-pits and malaria in railway construction and similar engineering undertakings is not mentioned, though these pits are incidentally referred to in connexion with refuse disposal. Perhaps a little more might be said on the risk of contracting anthrax from carcases of animals dead of this disease, for by law such carcases are buried whole and unenlightened persons may dig them up secretly and acquire the disease by handling and eating the infected flesh.

Chapter XIX, on *Housing and Planning* is a model of compact and sensible information, helpful to administrators, architects, builders, sanitarians, estate managers and public works officers. The dangers of domestic water-filters in adding rather than removing impurities, unless carefully attended to and cleaned, are pointed out. In the first-aid treatment of fracture immobilization "of the broken bones by bandaging the limb to a splint" is mentioned, but the untrained—and many certificated first-aiders are only partially trained—may not realize how important it is to immobilize the joint above and below the fracture. Chapter XXIV, bringing together matters of personal protection which have received mention incidentally in preceding chapters, is an excellent summary. The reviewer and, of course, many others are constantly being asked about protection against disease for those going abroad; this information is given here in the plainest words. Advice about mosquito nets for beds being *inside* the high bedposts is often neglected by the careless servant abroad and the bottom is left hanging free instead of being tucked under the mattress. No mention is made of the advisability of the lower part of the net being of linen or some unperforated material; during a hot night there is great temptation to throw aside the bedclothes and one's arms and legs come against the side of the net and are bitten by mosquitoes unless there is impermeable material between them and their prey. A final chapter sums up in a few words and trenchant sentences the subject of *Health Policies and Organization* and the work of the Colonial Medical Service. High praise must be given to the many very clear diagrammatic illustrations throughout the work.

The few criticisms above do not, they certainly are not intended to, detract from the excellence of this book. Its use for the instruction and guidance of those in authority to promote the health and welfare of the peoples under their care is in nowise lessened thereby, and we end by strongly recommending the book as an indispensable item in the equipment of every administrative officer, from the senior Governing Officer to the most junior estate manager. It could be read on the voyage out, digested at leisure, its directions applied throughout service and referred to at all times of doubt or difficulty. *H. Harold Scott*

London School of Hygiene and Tropical Medicine. Memoir No. 7. **Anopheles and Malaria in the Near East. Anopheline Surveys in Syria and Lebanon** [Leeson, H. S., F.R.E.S., Major, R.A.M.C.]. **Anophelism and Malaria in Transjordan and in the Neighbouring Parts of Palestine and Syria** [Lumsden, W. H. R., B.Sc., M.B., Ch.B., D.T.M. & H., Lt.-Col., R.A.M.C. & Yofe, J., M.D., D.T.M., Lt.-Col., R.A.M.C.]. **The Anopheline Mosquitoes of Iraq and North Persia** [Macan, T. T., M.A., Ph.D., F.R.E.S., Major, R.A.M.C.]. Introduction by Professor P. A. Buxton, C.M.G., F.R.S. pp. xii+223, frontispiece & 73 figs. 1950. London: H. K. Lewis & Co., Ltd. [35s.]

All readers of the *Bulletin* will welcome the decision of the London School of Hygiene and Tropical Medicine to resume publication of its Memoirs, a series which is intended for the publication of valuable scientific papers too long for

inclusion in most journals. The first of the Memoirs appeared in 1927 and the sixth in 1932, after which date publication ceased until the appearance of the present volume which, it can at once be stated, worthily upholds the high standard of its predecessors.

The Memoir contains three independent reports by different authors working, for the main part under wartime conditions, in separate areas in the Near East, but the authors have consulted together informally and have presented their findings in a more or less uniform pattern, which renders comparison easy. Their work is concerned with anophelines and malaria, but attention is concentrated on the entomological aspects, a statement which should not be taken as meaning that the findings are of interest only to entomologists, for they include clinical and parasitological observations, and the literature concerning malaria in the different areas is fully reviewed.

The results recorded do not lend themselves to brief summarization, but for the benefit of readers interested in a particular area or in a particular species of anopheline, the following details may prove helpful. It should be added that in each case the authors' accounts include a description of the ecology of the most important local species of anophelines.

Major H. S. LEESON describes the anopheline fauna of Syria and Lebanon. *A. superpictus*, *A. sacharovi* and *A. claviger* are regarded as the most important vectors. *A. marteri*, *A. sergenti*, *A. algeriensis* and *A. hyrcanus* are considered as unimportant, and *A. multicolor* and *A. pulcherrimus* as rarities.

Dr. W. H. R. LUMSDEN and Dr. J. YOFE survey anophelines and malaria in Transjordan and in the neighbouring parts of Palestine and Syria. They consider *A. sacharovi*, *A. superpictus* and *A. sergenti* are most likely to be concerned with the transmission of malaria. Other species recorded were *A. algeriensis*, *A. claviger*, *A. marteri*, *A. hyrcanus*, *A. dthali*, *A. hispaniola*, *A. multicolor* and *A. rupicolus*. The results of spleen and parasite examinations in 34 localities representative of different types of country are discussed, and methods of control are outlined.

Dr. T. T. MACAN's report occupies just half of the whole Memoir, and deals with the anopheline mosquitoes in Iraq and North Persia ; for the most part his work is confined to the vicinity of roads suitable for motor transport. "The carriers of malaria are *A. stephensi* in the alluvial plain region ; *A. sacharovi* in the foothill and escarpment regions ; *A. maculipennis* in the Persian plateau region ; and *A. superpictus* in the foothill, escarpment and Persian plateau regions." The following species, although common locally, appear to be of no importance in malaria transmission : *A. fluviatilis*, *A. claviger*, *A. marteri*, *A. algeriensis*, *A. dthali* and *A. multicolor*. *A. culicifacies*, *A. turkhudi*, *A. sogdianus* and *A. arabica* were only encountered in a few places, and then only in small numbers.

The authors must often have worked under very difficult and trying conditions, and they are to be congratulated on the successful collection of information which is not only of scientific interest, but which will prove of great practical value to all future workers concerned with the control of malaria in the Near East.

The price—thirty-five shillings—is high but, when allowance is made for the reproduction of the numerous maps and photographs and for the fine quality of the binding, paper and printing, it cannot be regarded as excessive.

R. M. Gordon

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